THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXVI. No. 1947.] LONDON, SEPTEMBER 4, 1900. [52ND YEAR. PRICE 6d.

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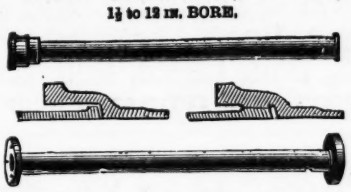

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At "The SHEFFIELD TELEGRAPH" Offices.
Reprinted from "The SHEFFIELD TELEGRAPH" June 27, 1900.
A SAVING IN FUEL OF £18 PER WEEK.

A couple of months ago when coal, which formerly cost us 8s. per ton rose to 12s. 6d., we read a lecture on the cost of steam production by John Holliday, in which the following paragraph appeared:—

Mr. Bryan Donkin, M.Inst.C.E., has published figures from some tests he carried out with different kinds of fuel in the same boiler, the conditions in all cases being the same; the results are comparable on the basis of the cost of fuel required to evaporate 1000 gallons.

Kind of Fuel.	Cost of Fuel per Ton.	Water Evaporated per Pound of Fuel.	Cost of Fuel per 1000 Gallons Evaporated.
	s. d.	lbs.	s. d.
A. Dust Coke	5 0	6	3 8
B. ,, Welsh Coal	10 0	8	5 3
C. Large ,, ...	22 0	9	10 11

Discovering that the Sheffield Gas Company made a considerable quantity of coke dust, which they gave away to builders and others, we entered into a contract for a supply for three years. Having a spare boiler, we had Meldrums' forced draught fitted, and soon discovered that coke dust made a very satisfactory fuel for steam raising. Our second boiler was then fitted, and we are now burning coke dust on the two almost exclusively. From an economical point of view, the experiment is very satisfactory, as will be seen from the following figures:—

Average week, Coal only, on One Boiler.

	£ s. d.
45 Tons at 12s. 6d.	28 2 6
Ashes at 2s., Seven Loads	14 0
	£28 16 6

Present Consumption on Two Boilers.

	£ s. d.
Six Tons of Coal at 9s. 3d.	2 15 6
Coke Dust	3 4 0
Two extra Stokers	2 12 0
Flues cleaning	10 0
Ashes, 12 Loads at 2s.	1 4 0
	£10 5 6

We shall be pleased to show the arrangement to anyone interested in the subject of the economical production of steam. There is no smoke from the chimney stack of the "Telegraph" Office, which is another good point in favour of coke dust as fuel.

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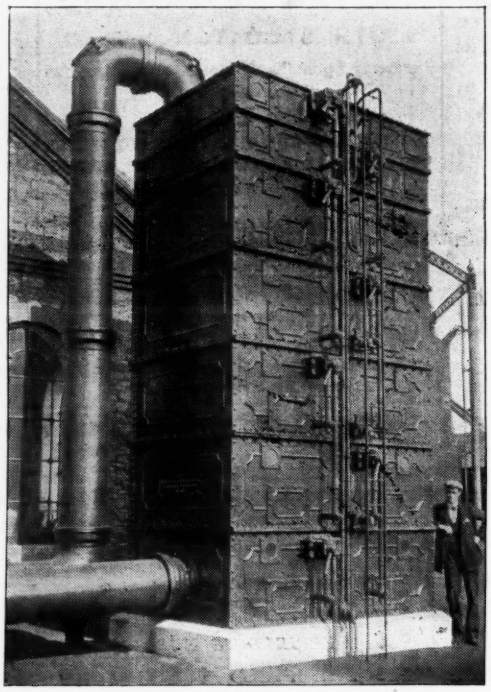

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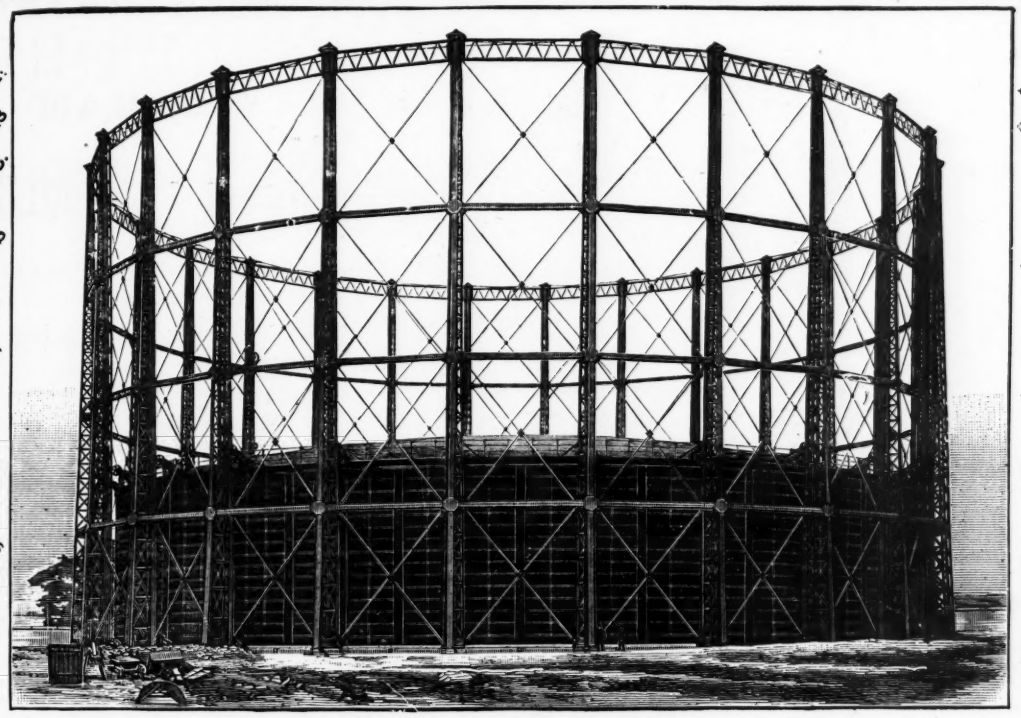

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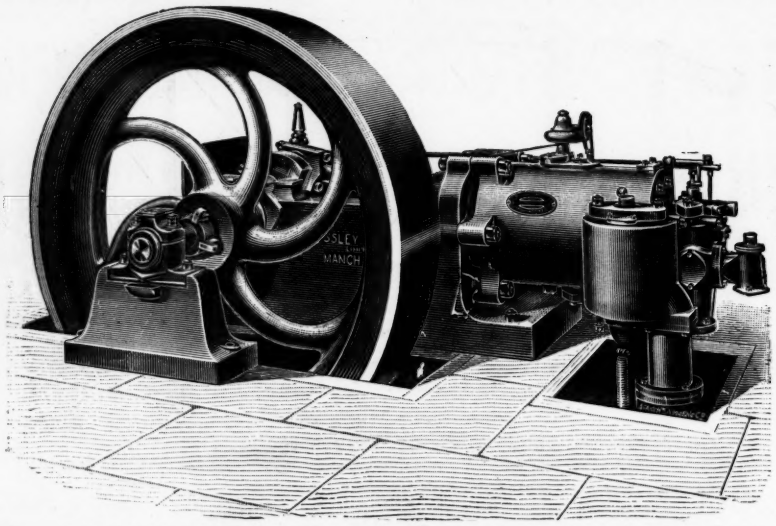

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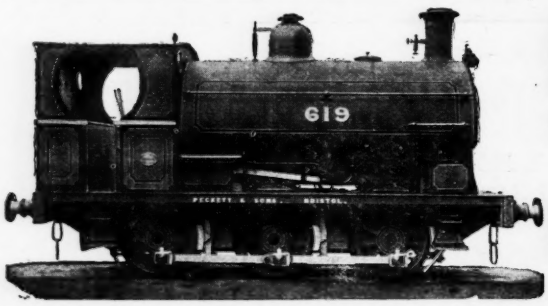

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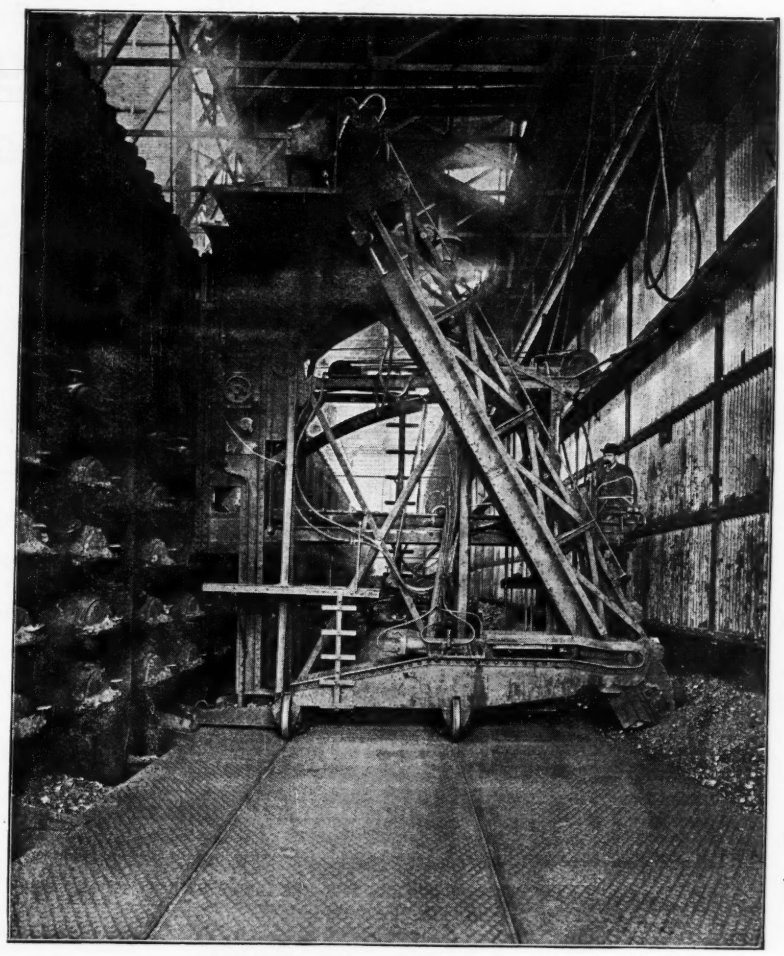

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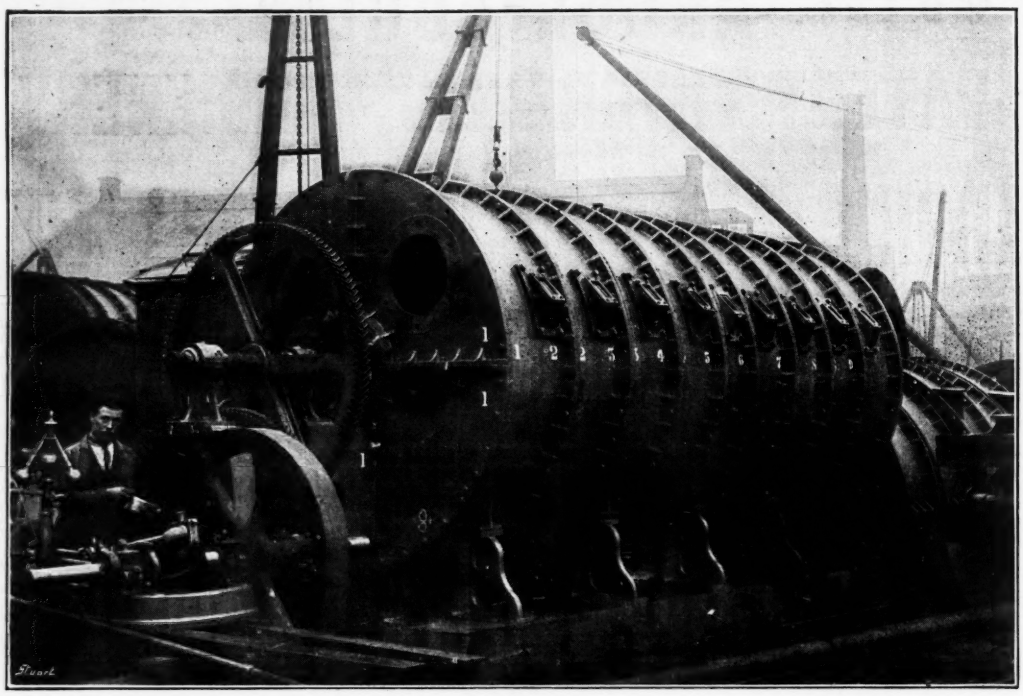

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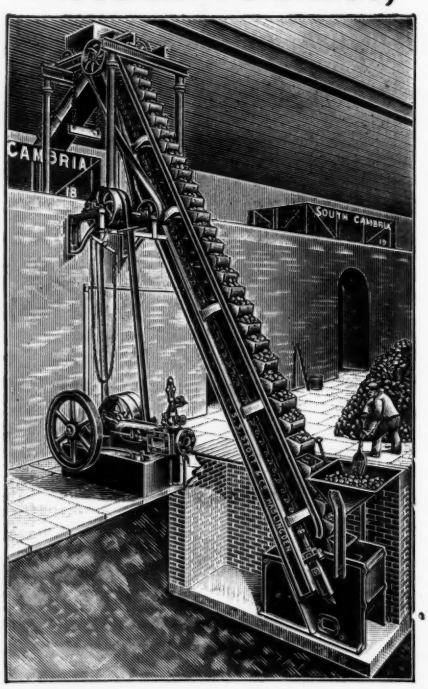

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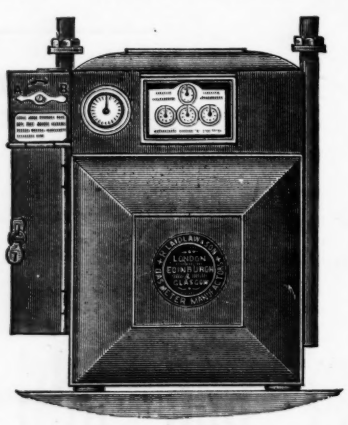

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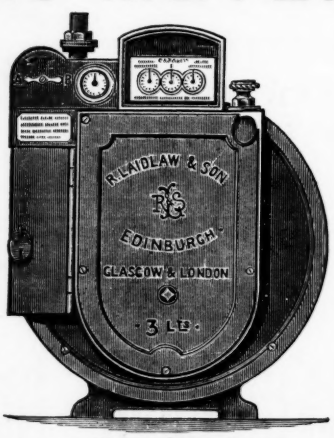

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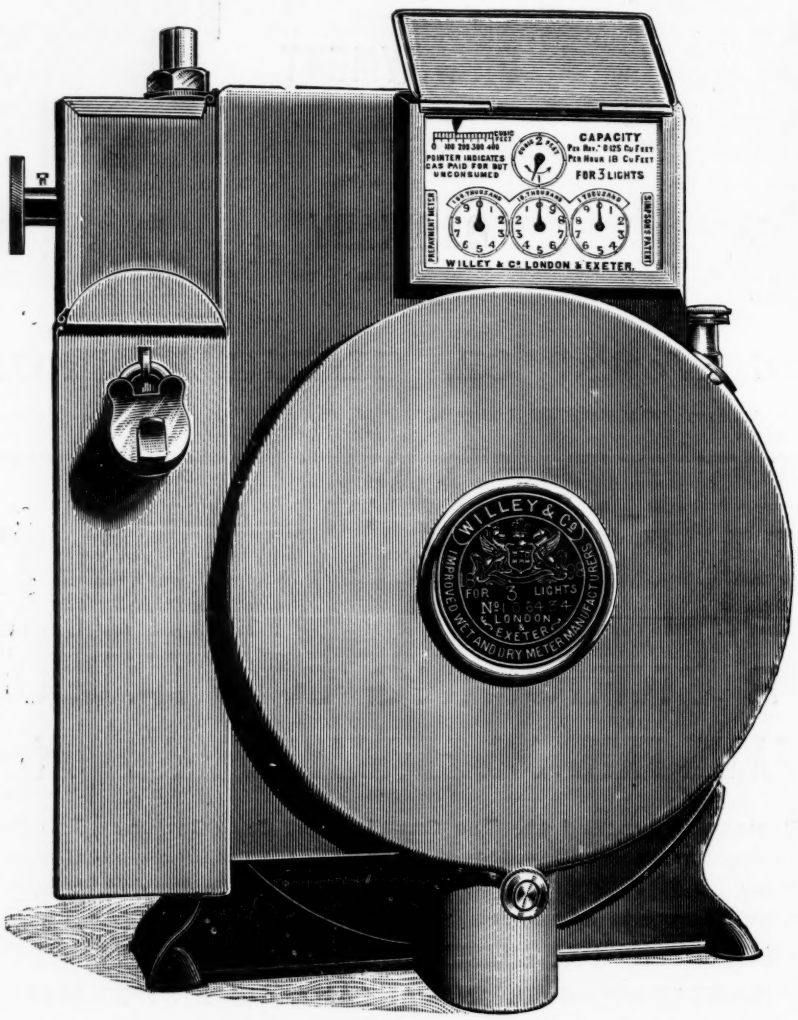

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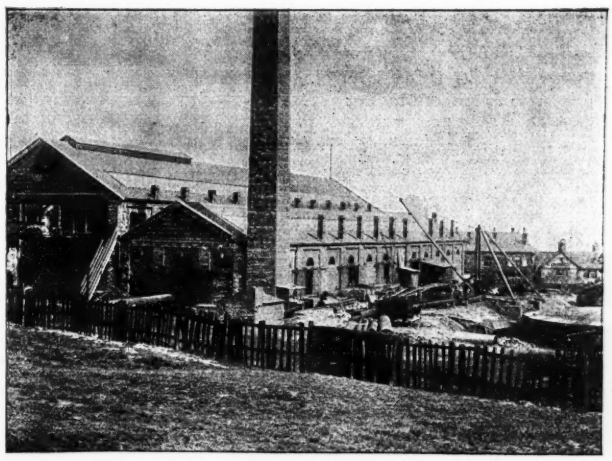

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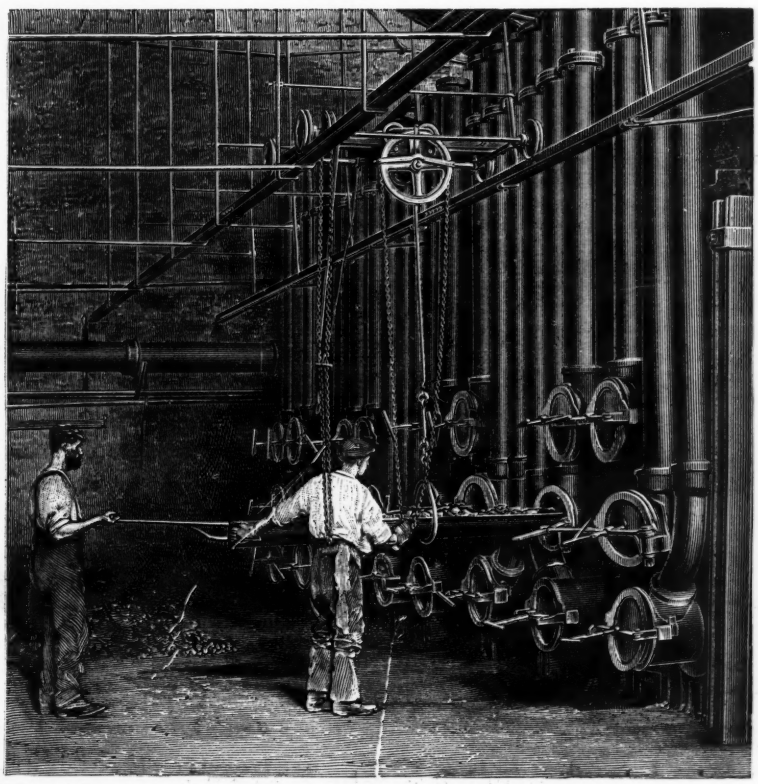

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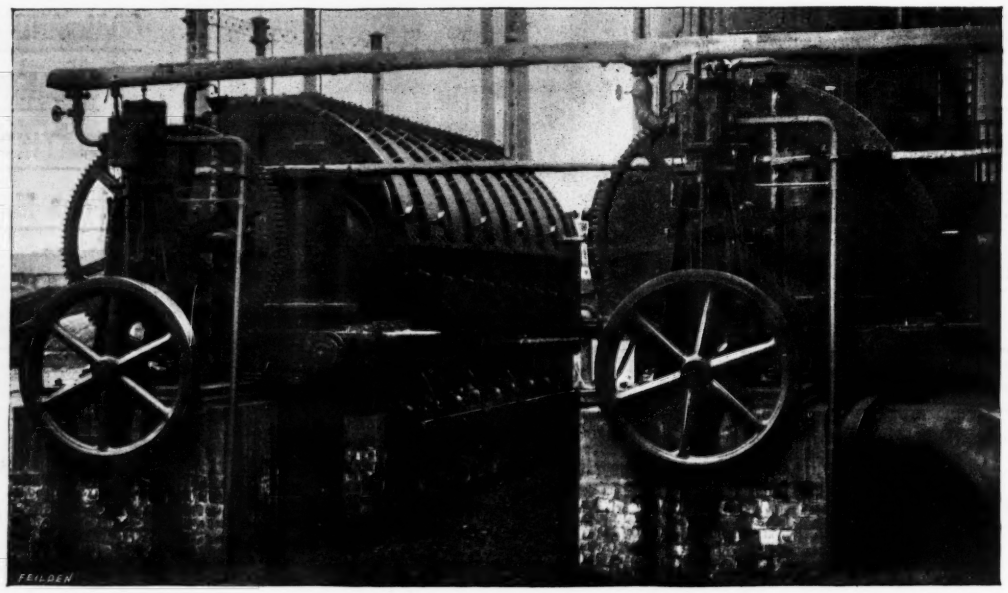

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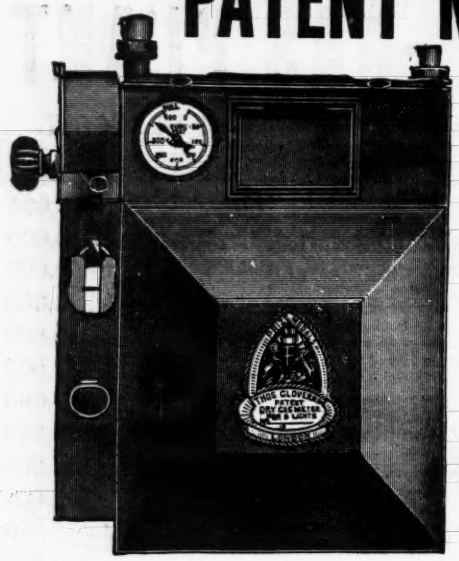

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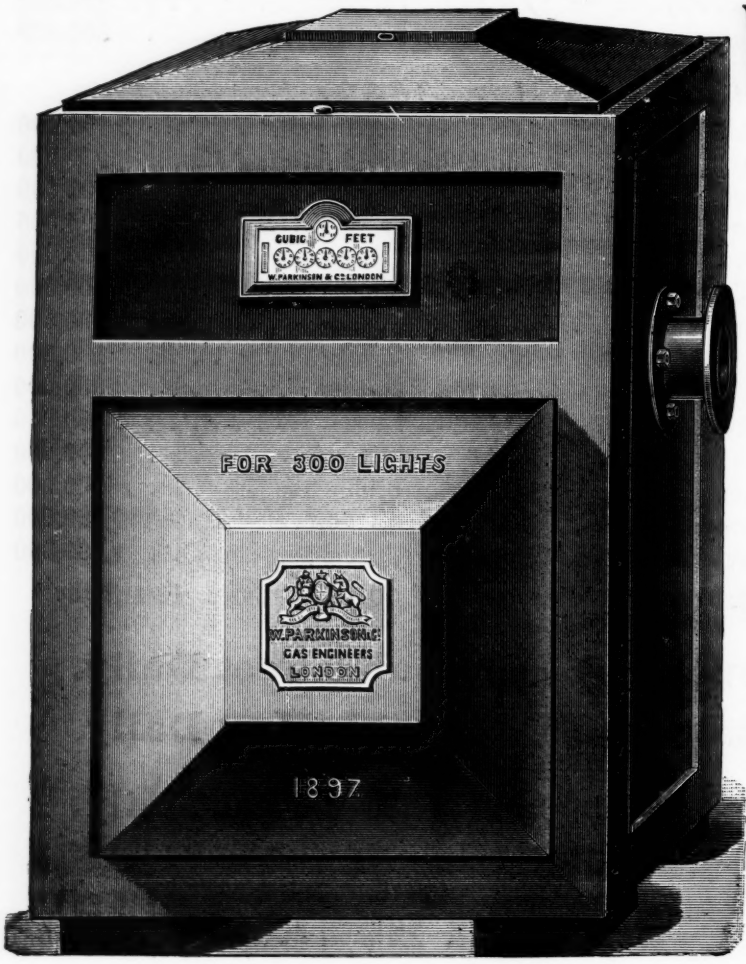

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EDITORIAL NOTES.

The Public Lighting of Provincial Towns.

THE observation that sentiment is a power in the workaday world is one of those truisms that everybody admits, and very few recognize when they encounter evidence of it in their own experience. Most people, when reminded of the fact, will agree as to its prevalence in various spheres of human activity of which they are more or less interested spectators; but when there is a question of the sentiment in regard to some affair of their own, the chances are that they will scout the suggestion that any such consideration is worth a moment's serious attention. The field of street lighting, for example, offers precisely one of these troublesome kinds of business in which commercial considerations and questions of sentiment jostle one another to the confusion of the practical wisdom that does not go much beyond the range of the principle that two and two make four. Since time out of mind, the hum-drum work of public street lighting had been settled between highway authorities and gas companies upon the barest, baldest grounds of necessity and economy. On the one part, the confessed desire was to spend as little as possible on this score, while, on the other, diplomacy was exercised to save everything that could be scraped out of the terms of the contract. Consequently, there were more disputes than enough over street lighting; but always on the ground of the expense. That there could be any other standard of merit never occurred to anybody concerned. The local authorities incessantly tried to screw up the photometric power of the gas, in order that they might be able to cut the hourly consumption of the street-lamps down by a cubic foot or two. They adopted the average meter system; and squabbled over the setting of the lamp governors. They were always scheming to cut out a supposed superfluous lamp here and there; and every necessary bit of extra lighting, as at busy street crossings, was a cause of groaning.

The appearance on the scene of the electric arc lamp was like the dropping of a new ferment into an old brew. Those who had the new luxury to sell flatly declined to recommend its adoption on the old grounds so painfully cultivated by the gas interest. They admitted that the lighting bill would be increased three or fourfold on the new system; but they dilated on the compensating advantages of novelty, fashionableness, innumerable candle power of light, and so forth. Amazing to relate, they were listened to favourably. Much-worried gas managers, grown grey in the service, and habituated to higgling over the cost of a cubic foot or two of gas, stood aghast at seeing their upstart rivals scooping in thrice or four times the lighting bills they ever made out of the business. They could not understand it at all. "Financial relations" had ever been their chief care; and they could not conceive of the possibility of conducting a street lighting branch on any other than the monetary basis. Consequently, they set to work valiantly to beat off the intruder with their old weapon of superior cheapness. The astonishing discovery was then made that a new and additional element, besides cheeseparing, had entered into the counsels of highway authorities. They had learnt to think somewhat of brilliancy of effect, attractiveness, and—most potent influence of all—they desired to be "in the fashion." If, like John Gilpin's wife, they still retained some frugality of mind, it was exercised upon the public gas lighting of the back neighbourhoods. In other words, sentiment had come into action in regard to public lighting.

It was hard for the gas interest to recognize the new fact; but evidence is accumulating that the recognition has at length come, and is ample enough in places to atone for all previous backwardness. It is, of course, the incandescent gaslight that has done it, through its own quality of novelty. Sentiment is no longer driven away from public lighting by gas by the familiarity and commonness of the whole thing. That is the redeeming feature of the actual situation; and local authorities are exhibiting a gratifying willingness to co-operate with gas companies to take full advantage of it. The other recommendation of the new system—its superior economy, which renders it available for the poor neighbourhoods as well as for the front streets—is peculiar to it, unprecedented, and unrivalled. It has for many years been contended in these columns that the best-lit city is not that which has the most brilliant boulevards—although this is admirable—but the one with no neglected

purlieus left in utter darkness. Perception of this principle is now also winning its way. Over all and through all this business, the power of sentiment is great, and must be studied that it may be controlled to good effect.

The following example is in point: Writing of the adoption by the Corporation of a certain town, in co-operation with the Gas Company, of a systematic scheme of public lighting framed with an intelligent appreciation of the resources of civilization in this respect, the local newspaper observes that "there is an idea in many minds that "electricity is the more up-to-date and aristocratic illu-"minant." Here is the sentiment confessed. Notwithstanding the very same journal willingly testifies, on the strength of the experience of a neighbouring town, that electrically lighted roads have not altogether the best of it; since, "for steadiness and equal distribution of light, "incandescent gas lighting is far superior to electricity. "It has also the recommendation of being much cheaper." This is a place, be it noted, where the Company supply the gas, while the Corporation do the electric lighting. Similar instances might be multiplied, and examples named. We do not propose to advertise all these progressive places by name, however, for the simple reason that to do so would bring upon the enterprising officials concerned a torrent of inquiries as to how it is done. This is not desirable. Every locality should work out its own schemes of lighting, and not be content with mere imitation. Emulation is admirable; and if the municipal corporations of this country would all concentrate their ambitions on the point of excelling in the proper work of local government and sanitary administration, there would be no municipal political scandals.

The Welsh Railway Strike Ended.

When a fire is observed to have broken out in the vicinity of a gunpowder magazine, the first duty is to get it put out as speedily as possible. All considerations of how it originated, or who might have been responsible for it, interesting and important enough in their way, must of necessity be reserved for subsequent investigation. Similarly, so that the spark is effectively quenched, it is not of primary importance that this should be done strictly according to rule, and by regularly accredited agents. There is a legend of an infirm King of Spain who was burnt to death through being placed too near an overheated stove, because the high Court functionary whose sole duty it was to shift the Royal invalid's chair could not be communicated with in time to prevent this unfortunate result. On this score, and on this alone, it is possible to feel a strictly moderate satisfaction in the sudden termination of the Taff Vale railwaymen's strike. South Wales is so eminently a region mined, so to speak, with a most sensitive kind of industrial explosive, and the trade of the country-side is so peculiarly one in substance—and that substance coal—that the prospect of the workpeople in any department of this trade being out on strike was something to be altered quickly, at almost any cost. In this case, happily, the trouble has been composed upon terms which, thanks to the foresight of Sir William Lewis, amount to considerably more than a patch-up of actual differences; but still, the whole affair has unquestionably been a sad muddle.

A synopsis of the story, as it has been told at extravagant length in the newspapers during the past few weeks, reads like a sketch-plot for a Gilbertian satirical comedy. It begins with an alleged grievance arising from the treatment by the Company of a signalman, whose hard case appears to have consisted solely in his being put to some other job at an advance of wages. Hereupon the Local Executive of the Amalgamated Society of Railway Servants decreed a strike, which the Central Executive of the Society at first censured as being hasty, and based on frivolous grounds. When next heard of, however, the same Society, by their chief officers, are "bossing the show," and working it for all it might be worth as a means of procuring "recognition of the Union." So clear was this political issue, that the coal miners of the district served by the Company, who now belong to the most militant of Trade Unions, were getting ready to back their fellows in the endeavour to win upon it; when in a moment the strikers yielded the point, and put the management of their case in the hands of men of the Company's service. Meanwhile, an injunction was applied for by the Company, and granted by the Court, to restrain the officials of the Union individually from doing that which their Taff Vale clients no longer desired them to do. Lastly, the incriminated officials are found playing the part of peacemakers, without credentials; but simply helping Mr. Hopwood, of the Board of Trade, and Sir William Lewis, to put the speediest end to a situation which had no reason for continued existence. The strikers, sobered by loss of wages and the unwelcome conviction that they were not indispensable, were willing enough to go back to their work; but, of course, they wanted their temporary supplanters sent away. This was perfectly natural; and so also, on the other hand, was the resolve of the Company not to throw over those who had come to their aid in the hour of need. A reasonable way of satisfying both demands was hammered out in the course of the negotiations, and accordingly the acute phase of the trouble is over. More than this, Sir William Lewis has persuaded both employers and employed in this particular service to accept a plan of conciliation which should render frivolous strikes impossible in the future; while the authorities of the National Free Labour Association have made it clear that their resources are not shorn of half their efficacy by being tied to rigid and perhaps impossible conditions.

The only safe moral of these railway labour troubles is the awkward one—for the companies—that it is incumbent upon them to reconsider their rates of pay and conditions of employment whereon these may have fallen behind the standard of the times. We say this with full regard for the interest of those other large employers of unskilled labour which is made valuable by organization—the gas undertakings of this country—who naturally compete with, as they partly support, the railway companies. The rural parts of the kingdom are drained of their able-bodied population to feed the railways and the organized industries of the towns. It is expedient that students of the industrial situation should go into the agricultural districts occasionally, and see for themselves the extent to which this process is going on. There is practically no unskilled, and very little skilled, labour of any value remaining in rural England. Not to speak of artisans, or of men who early take to some avocation which requires a period of apprenticeship, young country labourers are all on the look-out for berths on the railways, or in more arduous town employments if their physique is good enough. For obvious reasons, the railway company, which goes into the country, has the first pick of the untrained manhood of the country-side. The service offers a rate of pay which is attractive to the mere unformed agricultural hand. Once in the service, however, the man is fast bound to the system. He is liable to be sent hither and thither; and it is at least open to question whether the standard of pay and advantages is always and everywhere corrected to date. Gas undertakings have to do this, Union or no Union; and other large employers whose record in this regard is not similarly clear have only themselves to thank for any trouble that may arise in consequence.

Factors Affecting the Price of Coal.

The termination of the railway dispute in South Wales has happily removed what threatened to become a serious obstacle in the way of a return of coal prices to more reasonable figures. The effect of the strike will, of course, be felt for some two or three weeks to come, as so many vessels and orders have, during its continuance, been diverted from the Welsh to the North Country ports. But, provided that the spirit of disaffection do not spread and trouble break out on other coal-carrying lines—it is threatened, we note, on the North-Eastern Railway, on which the bulk of the goods traffic is mineral—no permanent disturbance of the coal market will ensue from the extra-trade difficulties of the past fortnight. The strike has, however, served to incidentally reveal, to those who were not previously aware of the fact, that the peace which at present reigns in the coalfields of South Wales does not rest on the sure foundation of goodwill between men and masters. Anything better calculated to prevent the successful termination of the negotiations, which were then in progress, for the settlement of the railwaymen's dispute, than the speech delivered by Mr. W. Abraham, M.P., to a mass meeting of colliers held at Porth on Wednesday last, could not be imagined. The suggestion that the Board of Trade representative, Mr. Francis Hopwood, had brought all his pressure to bear on the men and none on the masters, was as mischievous as it was contrary to the facts. And if this be the spirit in which disputes not directly concerning the colliers are approached, what hope is there of reasonable dealing with their own employers?

The significance of the speech lies, moreover, not only

in its substance—for many provocative and unwise speeches are made at such times—but also in the fact that the speaker was one who, in former days, was essentially a moderator and peacemaker in all disputes between the miners and the mine-owners of Wales. "Mabon," as he is always called down there, did more than any man to bring about the adoption by the men of the sliding-scale system, and was formerly trusted by employers and employed alike. Now, unhappily, the Miners' Federation have captured Mr. Abraham, and "we have changed all "that," with the result that, with the zeal of a pervert, "Mabon" is now more Trade Unionist than the Union leaders. The struggle of 1898 did not, unfortunately, end with the termination of the strike, as will be only too plainly seen when the existing sliding-scale arrangement ends, if it be not brought into evidence at an earlier date by the fall in coal and wages.

At the present moment, however, we may dwell rather upon the satisfactory circumstance that the output of coal will now resume its usual course, and upon the generally brighter prospect of the price resuming its normal level. The rush of the deluded householder to buy his winter requirements will soon be over, and this will have a steadying effect upon the market. It is amusing to note, in this connection, that the daily paper which had more than any other to do with the creation of the belief in the mind of the public that there was going to be a real coal famine this winter, is now—with the delightful inconsequence of the "ha'penny press," sublimely indifferent as to whether to-day's opinions tally with yesterday's—calmly informing its readers that "the price of coal is in part due to this panic "rush of the public, excited to believe that coal would go to "some figure like 50s. a ton." And this is the same paper that, on the 25th of July last, wrote, in a leading article headed "The Empty Grate": "It is expected that coal "will be dearer and dearer, till at Christmas fifty shillings "a ton may be looked for as *more than probable*. . . . "The prospects of winter are very dreary—most dreary "of all for the poor, who cannot make any provision for "the evil day. . . . But the sensible man who has a "little money in the bank, and a little room to accumulate "coal in cellar or back garden, will set about providing "material for his winter fires at once. . . . Anyhow, "coal is a good investment which promises to pay 50 per "cent. on capital within six months." So does the Press "enlighten" the Public! The plan adopted is apparently to send the office boy or a "young man from the country" on to the Coal Exchange, to ask when coal is going to be cheaper. "Cheaper?" says the coal merchant who has a thousand tons or so to dispose of, "Why, you'll be lucky "if you can get it at any price in a month's time!" Off trots the young man to the office of the paper, and out come the head-lines: "Buy your Coal! Going up Next Week!" The gentle reader sends off an order for all he can stock, under the impression that he is getting the better of his neighbours, who all do the same, and the price *does* go up next week. Then the coal merchant smiles. Of course, the public must have its paper, and have it cheap; and how could it be done if the journalist troubled about the accuracy of what he wrote?

When a Gas-Works is a "Factory."

THE decision of the Hove Magistrates in the matter reported in last week's "JOURNAL" (p. 529), where the Brighton and Hove Gas Company were summoned for infringing the Factory Act, 1898, is of considerable importance to gas companies throughout the United Kingdom. The facts were not disputed; the only question being as to whether the Company really came within the scope of the legislation cited. This is an old difficulty, which has always troubled managers of small and moderate-sized gas-works. Indeed, it is impossible to lay down by hard-and-fast rule that a gas-works is or is not a factory. This is a question of conditions and of degree. Its solution is complicated by the habit of legislating simply by reference, which is so frequently complained of. Everybody is familiar with the roundabout way by which alone it can be decided whether a gas-works is or is not subject to the Workmen's Compensation Act. So likewise with the subject-matter of the Brighton and Hove Company's case. Here it was admitted that the gas-works was a factory within the meaning of some Acts; but not of others, including the one under which the local Inspector of Factories took his action. The law, however, seems to be as the Bench interpreted it. The Company employed seven "young persons" on a Sunday; and it was alleged that this was an offence against the provisions of section 93, sub-section 3, of the Factory and Workshop Act, 1878. It is difficult to see any escape from this conclusion. A gas-works in which power machinery is used is a factory within the meaning of the Workmen's Compensation Act; and one in which "young "persons" are employed is as certainly within the scope of any law intended for the protection of this class of labour. Doubtless, the Company acted in perfect good faith, and they could plead with some effect the confusion caused by the enactment in one year, and the repeal the next, of the statutory requirement to give notice of works accidents. The contention raised by Counsel for the Company that gas is not an "article" the manufacture of which brings them within the section cited, is a legal quibble which is not entitled to respect. In the last stage of the case, the Company were better advised, and pleaded simply in mitigation of penalties that the prosecution had taken them by surprise. An offer on the part of the Bench to state a case for the Superior Court was wisely declined; and the defendants got off for nominal fines. The lesson will not be thrown away. Gas companies who find it expedient to employ young persons, and necessary to work on Sundays, will have to adjust their arrangements to the same law that applies to other factory owners.

More Financial Journalism.

THE "Financial News" recently published some terrible balderdash in reference to the asserted failure of Parliament last session to do justice to what is vaguely described as "electrical promotions." The fact that the various schemes for the generation and supply of electricity in bulk were not allowed to ride roughshod over all the municipalities and established companies within their sketched-out areas, seems to be at the bottom of this complaint. To the ordinary person, it appears a very debateable proposition that any scratch company professing so nebulous an aim as the supply of electrical power for all purposes at next-to-nothing prices should be granted statutory powers for the asking. Yet here is a "grievance"—that a House of Commons exceptionally well furnished with engineers of high repute, with ardent electricians, and with an ample contingent of capitalists, has distinctly shown the cold shoulder to these schemes. "It did not "require a death-daring temerity, for example, to risk the "assertion that electricity would eventually supersede "mineral oils, if not gas, and would probably run gas "down to a normal instead of to the present exorbitant price." If the writer of these nonsensical lines had had any experience of the work of Parliament, he would have known that these generalities will not carry a Bill through Committee. The electricians and their Press partisans have a wonderful knack of self-deception. But there are others in the same business; and the marvel is, not that the Electrical Power Bills of last session survived in a modified form, but that they survived at all. For they all failed of proof that the supply of cheap electricity in bulk is economically possible. It was not the gas interest that checked the aspirations of these "wild cat" projectors, but the undeniable statements of working municipal electricians. They talked of supplying cheap electrical power for industrial purposes, and were confronted by evidence that the Manchester Corporation and others are quite ready to do this, and have offered it for years without meeting with any real encouragement. Talk of the "exorbitant" price of gas! Why, the lowest-priced electrical power ever heard of in this country leaves the gas-engine master of the situation. That is the real trouble of the electricity-in-bulk promoter. And what of his newspaper friend? The "Financial News" says that "the "well-established theory of the electrician is that the "larger the area of distribution the more efficient and "the cheaper is the supply of motor and lighting power." This is as much as to say that the commercial value of a "milk-walk" depends upon its extent. Ordinary business men would have supposed the contrary to be true; but your financial journalist is no ordinary man. He lives in a strange world, where the greatest of all powers is not usually talked about.

The Chancellor of the German Empire has issued an ordinance to the effect that the Réaumur thermometer will not be admitted to official control after Jan. 1, 1901. This will lead to the exclusive use of the centigrade thermometer in Germany.

WATER AND SANITARY AFFAIRS.

THE news which reached London at the close of last week, that the investigation which it was considered advisable to institute into the cause of the death of a patient in the Belvedere Hospital, Glasgow, on the 27th ult., had justified Dr. A. K. Chalmers, the City Medical Officer of Health, in stating authoritatively that it was due to bubonic plague, came as an unwelcome exemplification of the truth of the adage that history repeats itself. It is two centuries and a half since London was stricken by the terrible scourge which has again made its appearance; nearly one-seventh of the population being carried off. Its home was formerly Lower Egypt, Turkey, and the shores of the Levant; but it has absented itself since 1844, and has taken up its abode in India, where it has assumed epidemic form. How it has been imported into this country we do not know. It is stated with some authority that rats are very active agents in the spreading of imported plague among populations; and it is, of course, possible that one of these objectionable rodents, arriving from abroad in an infected condition, may have been landed in Glasgow. But it is not very clear how the creature could have communicated the infection. But there is the very patent fact that twelve people are under treatment in the hospital (five of them, however, presumably suffering from enteric fever, with some symptoms of the plague), while fifty suspected patients are in the reception-house. These were to have been inoculated last Friday night with anti-pestiferous serum from the Pasteur Institute in Paris. Prompt measures have been taken by the Corporation to prevent the spread of the disease—all the houses standing near the one in which it originally broke out having been declared within the sanitary area, and arrangements made for their cleansing and fumigation. The child of the man whose death gave rise to the investigation has also died; and the bodies of both are to be cremated. It is understood that the same course will be adopted in all other cases in which death may ensue. The Customs authorities of Glasgow last Friday refused to clear vessels in the harbour; but lower down the Clyde no impediment was offered.

It is not surprising to read that the announcement made by Dr. Chalmers has created quite a consternation in Glasgow, as it dispelled all the hopes which had been cherished that the rumours as to the case under investigation being really one of bubonic plague might prove unfounded. It has been deemed advisable to publish full details of the nature and symptoms of the disease, with the view—commendable to some extent—of ensuring detection and preventing unfounded scares. Unfortunately, however, nervous people reading these details, and possibly being troubled at the time by a slight ailment which resembles some characteristic of the dreaded disease—glandular swelling, for example—are apt to take unnecessary alarm. This was the case on the occasion of the great epidemic of cholera in 1848-9. Now, this is just where trouble is likely to arise. Only a small proportion of the medical practitioners of this country have had opportunities of seeing cases of plague, the signs and symptoms of which, as pointed out by the "British Medical Journal," are not of such a character as to lend themselves to speedy diagnosis. If it were stamped with symptoms as definite as those (say) of small-pox, there would be but little chance of infected persons getting ashore from ships or being allowed to remain unisolated. It is owing to its insidious and complex nature that plague finds its way over the world. There is all the more reason, therefore, that the utmost care should be exercised in the diagnosis of any suspected cases coming under the notice of the general practitioner, in order, primarily, that the disease may be properly dealt with if present, and all unnecessary alarm dispelled if not.

If the disease which is now causing trouble to the medical authorities and inhabitants of Glasgow is an importation from abroad, it is one which will scarcely be received with the cordiality which Englishmen have been so fond of displaying towards anything of foreign origin. But we are inclined to think that local conditions are to some extent responsible for the outbreak. Bubonic plague, like typhus, is a "filth" disease. Of all the causes co-operating to its propagation, apart from the "rat" theory and communication by means of clothing and merchandise, uncleanliness is the most powerful—that is to say, the accumulation of decaying animal matter around dwellings, and the consequent saturation of the soil with filth, accompanied by poverty, overcrowding, and defective ventilation. Such conditions as these may be considered to act by supplying a suitable environment for the life and growth outside the body of the specific poison which when received into it produces the febrile state which develops into the disease. When they are absent, one of the main factors contributing to the spread and permanence of the plague will be wanting—a fact which makes it probable that the greater attention to cleanliness facilitated by ample water supply and improved sanitary arrangements is the chief cause of its disappearance from Europe. We do not say that in the particular street in Glasgow where the disease first showed itself all the conditions conducing to the existence of plague which are enumerated above are to be found; but, at all events, it is one of the poorest in the city, the residents having, it is reported, been forced to "huddle together" in single apartments owing to an adjoining railway extension. Moreover, certain parts of Glasgow are, as most people know, by no means salubrious; while, interesting as is a journey by steamboat down the Clyde to hear the "music of the "hammers," those who are not to the manner born generally prefer to escape the disagreeable odour rising from the river by going by train to Greenock or Gourock, and embarking there for the Highlands. Dr. Bruce Low is of opinion that the plague is indigenous in many hitherto unsuspected quarters; and Sir Richard Thorne Thorne, writing in his capacity of Chief Medical Officer of the Local Government Board, declared that, inasmuch as no system of inspection or other restriction is perfect, all we can do is to "trust to "such local sanitary administration as will deprive such a "disease of the means of diffusing itself." One of the first measures to be resorted to must be the isolation of the patient; the next, the remedying of those insanitary housing conditions which are capable of producing an epidemic. Fortunately, Glasgow has a good and abundant water supply; and, as the sanitary staff has been doubled, the Medical Officers of Health are confident that they will succeed in arresting the progress of the disease, and finally stamping it out. Though the announcement of its appearance among us naturally caused anxiety, we believe, with the "Lancet," that, owing to the ability of modern sanitary science to localize outbreaks of infectious disease in well-governed communities, there need be no cause for panic.

We referred last week to some of the subjects discussed at the International Health Congress recently held in Paris. The importance of keeping the air inside a dwelling-house sweet, came in—and deservedly—for a large share of attention; but seeing that this air enters the building for the most part by the windows and doors, it was only right that some consideration should be given to the question of aërial sanitation. This was dealt with by experts selected for the purpose by the Committee of Organization—M. Armand Gauthier and Professor Gréhant taking up the question of the prevention of smoke, noxious gas, and dust in towns; and M. Pucey discoursing upon the interior arrangements, the decoration, and the aëration of houses. Of course, allusion was made to the labours of the Committee appointed to examine and report upon the smoke-consuming appliances exhibited at South Kensington in 1882, and to the experiments of Professor Chandler-Roberts in connection therewith; also to those of M. Gauthier on the atmosphere of Paris. The principal conclusion arrived at was that the insalubrity produced in the air of large towns is much less redoubtable than one would be led to suppose; but it was acknowledged that local causes might give rise to a dangerous accumulation of certain gases in particular quarters or in densely populated places. It was as well that this was admitted by a body of sanitarians, because the ordinary person is quite conscious of the fact. And here it may be incidentally remarked that in removing one nuisance we are very liable to create another. For example, the proximity of garbage and refuse is admittedly undesirable; and any means of effectually destroying it are welcomed. Yet most people are aware that the process is attended by the evolution of a certain pungent odour which is certainly not pleasant. At the same time, it is doubtless less dangerous to health than would be the emanations from the rubbish which is being consumed. The Congress did not make any definite pronouncement on the subject of the air of towns, but passed a resolution embodying the very self-evident proposition that all the rooms in a dwelling-house ought to be perfectly ventilated; the air being continually renewed in winter as well as in summer, on the sole condition that no injury results to the occupants' health.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 593.)

BUSINESS on the Stock Exchange in the week just concluded shows no improvement upon its predecessor, so far as any increase in volume is concerned; but there was certainly a decided amelioration of the tone. The causes are naturally to be sought in the brighter prospects in the Transvaal and in the avoidance of the Taff Vale difficulty, coupled with one or two minor influences working in the same direction. Consequently, prices show an advance in most departments, though not an extensive one; gilt-edged securities being in front of the movement. The settlement was a light and easy operation. In the Money Market, there was a good demand—Stock Exchange necessities and the usual requirements at the end of the month creating a want; but discount rates were somewhat easier. In the Gas Market, business continues to be at a very low ebb, and quite devoid of interest. It is, however, a favourable indication that, in spite of the inactivity, which so often produces a tendency to droop, prices rather show a disposition to improve. Actual changes are very few; but they are in the upward direction, and they affect the two leading stocks in the market—the Gaslight and Coke and South Metropolitan. Gaslight ordinary had a rise of a point after being very moderately dealt in at steady figures; but the secured issues were hardly touched, and made no sign. South Metropolitan opened at top price, and then gained a point, but the closing figures did not evince any disposition to advance further. Commercials were almost untouched and unchanged. Transactions in the Suburban and Provincial Group were of the lightest; and the only change was an advance in Tottenham and Edmontons from the very low figures they had been put back to. Among the Continental Companies, there was business on a small scale in Imperial and European at the old figures, without any sign of change. All the undertakings in the remoter world were devoid of feature. In Water, although actual business done was on about the usual limited scale, there was a marked improvement in prices pretty well all round.

The daily operations were: Business in Gas opened extremely quiet on Monday, and quotations did not vary. There was a very slight increase in volume on Tuesday; but still nothing moved. Wednesday was about the same; but South Metropolitan improved 1. In Water, Chelsea rose 4½, East London and both Lambeths 2 each, and Southwark 1. Thursday was a very quiet day; but Gaslight ordinary advanced 1. In Water, East London rose 3, and Chelsea 2½. Gas was again unchanged on Friday; but in Water, Lambeth tens rose 2. Saturday was almost a blank day, and quotations closed as before.

ELECTRIC LIGHTING MEMORANDA.

The Electricity Supply of Dublin—Change of Regime—The Political Scandal—A "Twopenny-halfpenny" Venture!

THERE has been little of political interest of late to record in connection with electric lighting; but the decision of the Dublin Corporation to proceed with their very questionable electric lighting scheme, involving the creation of a new generating centre at Pigeon House Fort, is too serious an event of this nature to escape mention. We have already explained in all necessary detail the characteristic features of the Dublin situation, and have shown how different obscure political and personal considerations have influenced its developments. Essentially, doubtless, the case of the people of Dublin in respect of electricity supply is very much that of the gentleman of the classical period who, upon asking a professional Augur whether he should marry or not, was assured, in response, that whichever course he might take he would surely repent of it. The Dublin Corporation have hitherto made a wretched mess of their municipal electric lighting, both financially and technically. It ought not to be forgotten that this Corporation was the originator of the grand idea that a sinking fund for the repayment of a loan is tantamount to a depreciation fund for the maintenance of industrial plant in a profit-earning capacity. This "Dublin plan," as it was called, was gleefully adopted by the St. Pancras Vestry; and other local authorities have not been backward in following such an easy way into the "Fool's Paradise." Long ago, however, the plan came to grief in the place of its origin, when the Corporation experienced the greatest difficulty in obtaining more money for the renewal of worn-out cables before the first advance to pay for them had been half or a quarter repaid.

Dr. Kennedy then came to the assistance of the Corporation, and, by a plausible convention under which the new cables were charitably supposed to be extensions, and not merely replacements of the old ones, the Government of the day winked at the financial juggle. The result has proved the reverse of satisfactory, and should serve as a deterrent from any repetition of the operation to "save the face" of a local authority. The whole of the original Dublin Corporation electric lighting venture is to be swallowed up in a big extension, upon lines which the expert who has once saved the Corporation could not recommend. It is needful to tread warily in this part of the narrative; but, as the Lord Mayor recently put it, "Professor Kennedy reluctantly withdrew his connection with Dublin, and Mr. Robert Hammond was appointed in his stead." It is Mr. Hammond's scheme, already criticized in the "JOURNAL," that the Corporation have determined to carry out, under influences which cannot be described here. In the interval between Kennedy and Hammond, there arose in the land of Erin a new power, whose name was Murphy. He came with American ideas of electric tramway traction and lighting, and offered to take the responsibility of providing ample electricity for Dublin off the shoulders of the Corporation, who had already failed under a smaller burden of the kind, upon terms which the House of Commons regarded as fair and reasonable.

The affair, however, was Irish to the core. The various "interests," instead of relying on the merits of their respective schemes, proceeded to acquire or influence local newspapers, which duly belauded them and abused their opponents. Rival contingents of Members of Parliament were engaged to "lobby"—euphemistic term—for and against the various schemes; and the proceedings at Westminster were accordingly of the kind which newspaper reporters of "scenes in the House" love, but make the judicious grieve. The Dublin Gas Company were, of course, accused of having a hand in this high political and municipal game; but the truth or falsity of this accusation does not concern us. We only repeat the story to show how little the merits of anything of the kind have to do with its fortunes. Now the Corporation have committed themselves to the acceptance of tenders for £46,000 out of an estimated expenditure of £254,000 for the starting of Mr. Hammond's scheme, which, of course, means that, whatever the subsequent costs, the whole enterprise must be gone through with. It is to be desired that the next public advocate of the municipalization of such undertakings as electricity supply will not overlook the example of Dublin. The spirit in which the Corporation have gone into the business is sufficiently disclosed by the concluding words of the Lord Mayor's speech recommending the approval of the Committee's report: "They talked of Home Rule; but if they were not capable of carrying out a twopenny-halfpenny job like this, they were not capable of governing Ireland." This is the politics of the whole thing. Politics it is, for good or for evil; but it certainly is not business.

Just look at this "twopenny-halfpenny business" in relation to the financial position of the Corporation and the crying needs of the City of Dublin. One of the most insalubrious of British or Irish towns, to judge by the death-rate, Dublin has almost everything to do to get into a thoroughly healthy state. There is not a penny of superfluous rateable value in the Corporation area; and, in face of this, the Town Council, which certainly does not contain the best industrial and commercial talent of the city, is bent upon incurring an immediate further capital liability of over a quarter-of-a-million sterling, with nobody knows how much more to follow in the inevitable "surprise packet." The cream of the joke is, besides, that the Tramways Company would have done the whole service as cheaply as the Corporation, with the certainty that in the regular course all the plant would fall to the Corporation at the actual value. The precise figures are as follows: The Tramways Company would have bound themselves to supply the Corporation in bulk with electricity at from 2¼d. to 1⅝d. per unit. And the Corporation could have seen that the Company did it, and did it well. There were other advantageous terms. Against this, the ratepayers have the bare statement that "the Corporation proposal is to supply the consumer for 1½d. per unit." Who is to see that this promise is fulfilled? Those theorists of local self-government who make so much of the power of the ratepayers to keep a check upon the local authority might be commended to seek in all this story of the Dublin electricity supply for the faintest indication of any such power in practice. It will be small satisfaction to the Dublin ratepayers in a few years' time to turn out of office the mistaken, or unjust, town councillors who have consented to this extravagant scheme.

THE LATEST AMERICAN DISCOVERY.

THE alleged discovery recently described in a contemporary as having been made by the great American electrician, Mr. Tesla, has been hailed in some quarters as affording, "if it proves true"—an "if" of some importance—a solution to all problems concerning the future supply of energy to the World's commercial wheels, and as, incidentally, extinguishing the whole industry of gas manufacture. Everything in future will be done by electricity—coal will not be "used at all in industrial undertakings, and used in houses only as we now use wood, to give the pleasant sensations attendant upon an open fire." Electric lighting will be so cheapened that we shall no more be "poisoned by gas or run the risk of fire from lamps" (there is none, of course, from electricity!). Light and warmth will be supplied "with as much ease as water, and possibly at a smaller cost." Fogs will be banished for ever and a day. All this will happen, we are told, if Mr. Tesla's discovery makes good its claims.

What, then, the trembling holder of gas shares may be asking, is this subversive discovery that is going to revolutionize the economics and habits of the world? It is nothing less, nor more, than that of means for conveying electricity unlimited distances, across continents and under oceans, without loss of power. This is to be done by freezing the conducting metal by means of liquid air or gas. Mr. Tesla, we read, purposes to carry a metal tube, immersed in a trough containing sawdust and water, and placed some 6 feet below the surface, to any required distance

from the source of power (which, we gather, is to be Niagara Falls). Through this surrounding material—we are quoting from the "Spectator," not usually given to the dissemination of the absurd—Mr. Tesla will "force a current of liquid gas, which will freeze the enclosed metal, and thus neutralize the heat generated by the passage of the electric current. There is no reason why this trough should not be carried across an entire Continent, and probably none why it should not be laid (like any ordinary cable) under the Atlantic or Pacific Ocean." Well, in these days of scientific achievements of the apparently impossible, one approaches the account of any new discovery with a mind prepared for the surprising, and free from a preconceived scepticism as to the value or truth of the alleged attainment. But the foregoing is too strong meat for the digestion of our credulity.

The application of liquid gas to the conductor may and doubtless does facilitate the transmission of electricity—that is a thoroughly credible contention. But how, in the name of fortune, is it proposed to maintain a constant flow of liquid gas, which shall remain liquid throughout the whole length of its course, from one side of the Atlantic to the other, even presupposing the possibility of successfully laying such a trough as is described from Ireland to Newfoundland? Indeed, how could such a flow be maintained from one end of London to another? We await the answer to this rather important question with interest. Further, assuming these preliminary—and vital—points to be satisfactorily answered, What of the cost? All we are told is that "it has been calculated"—mark the word—"that electricity generated at Niagara could be delivered at Albany, 330 miles away, at a cheaper rate than steam-power can be generated there with coal at 12s. a ton." When the word "calculated" is able to be written "proved," we will then consider the further statement that "it will be as easy to take the electric current 3000 miles as to take it 300."

The writer in the "Spectator" remarks that "at any time this discovery would have extraordinary interest; but at a moment when every industry and every housekeeper is alarmed by the rise in the price of coal, it comes with exceptional opportuneness." It would be nearer the mark to say that, at a moment when, as a rule, the silly season is in full swing, an enterprising journalist has introduced a new form of "sea-serpent," trailing its trough along the bed of the ocean and living upon liquid hydrogen. If the coal consumer has to wait for relief from his present sufferings at the hands of the coalowner, until the Niagara-generated electricity arrives in this country, he had better cut his losses and resign himself to his fate. But we really don't advise gas stock proprietors to sell out just yet.

THE BURDEN OF COAL.

The September number of the "Nineteenth Century" contains an interesting article under the above title on the burning question of the day, from the pen of Mr. Benjamin Taylor. The subject is handled in a very able manner by a writer who, not by self-announcement, but by performance, is seen to be "one who knows"—a phrase so frequently used as a gloss for ignorant anonymity. Mr. Taylor hits the serious nature of the present situation on the head at the outset, when he says that "the burden of coal . . . . is crushing the life-blood out of our industries, for we have the fact, more serious than the woes of the householder, that the cost of production is going up, while the prices of finished products are coming down. One cannot imagine a worse economic position than the combination of advancing costs and lowering prices." This is the outcome of the extraordinary and almost universal growth of industrial enterprise during the past two or three years, with its consequent increase of demand upon the available supply of power, of which coal is the prime source. The production, although stimulated, proving inadequate to this demand, the colliery owners have been enabled—and have not withstood the temptation—to run the price of coal up to such a figure as is becoming a veritable millstone round the neck of the iron and steel trades. Such is, in face of the increasing competition of other countries, a matter of serious national importance; and we have on more than one recent occasion given expression to the conviction, borne in upon us by a careful consideration of the present and probable future situation, that the consequences to the trade of this country of the tremendous increase in the cost of fuel will be more grave and lasting than the coalowners appear to have realized, or care to consider.

While it is true that the colliery proprietors have been guilty of taking extreme advantage of their opportunity—to their own eventual undoing—it must be admitted that, unless they were formed into an all-comprising ring, the owners must necessarily be led, as regards the ruling price, by the most grasping and least far-seeing among them; for if buyers be in such need that one colliery can obtain thirty shillings for all the coal it can produce, will its next-door neighbour be so heroic as to refuse to ask more than twenty, though he know full well that the ultimate result of imposing the higher price will be serious damage to his own trade? He is, we fear, much more likely to ask thirty-five shillings, and then try to sell his colliery to a company promoter. It is not easy to discover any remedy; there is probably none that would not, in the long run, be worse than the disease, except the natural course of events. But, as Mr. Taylor says, "it is not pleasant to think that industries may die in order that colliery owners may dine off gold-plate."

If, further, the probable future damage which the coal trade, in common with the other industries of the country, will suffer as a consequence of present undue prosperity, be not recognized or heeded by the educated and shrewd men of business who own and manage the collieries, is it to be expected that the comparatively ignorant collier will take a more enlightened view? Of course not; and, therefore, the miner is in no hurry to bring down the price to reasonable levels by an increased output. He forgets, if he ever knew, that there is another factor that influences price beside supply, and that this is demand, which high prices tend to kill. The restriction of output fallacy, combined with the fact that there is "not much temptation for the collier to go down into the bowels of the earth six days a week, if in four days he can earn as much as will keep himself and family, not only in comfort but in luxury, compared with the short commons of recent years," are proving instrumental in accentuating the prevailing prosperity of the trade; but they will as surely result in considerably curtailing the period of its duration. A largely augmented output of coal at a moderately increased price would have sustained the industrial activity of the world for a very long time, with great benefit to all concerned in the business of coal mining. It is infinitely better for a man to earn £500 in each of two years, than to make £700 one year and £300 the next. He will very likely, in the latter case, be a bankrupt at the end of the period, to the damage of himself and his creditors.

Mr. Taylor naturally refers at some length to the fact that the increased coal consumption of Europe has been very largely responsible for the shortage of coal in this country; no less than 6½ million tons more being supplied to European countries in 1899 than in the previous year, while our total exports accounted for rather more than one-fourth of our output. This leads him to the consideration of the oft-discussed proposal to restrict or prohibit the export of coal. On this his views are emphatically hostile to the suggestion. "Such a proceeding," he says, "would be suicidal, for it would destroy the best part of our maritime commerce. Coal is practically the only commodity we have to send away in any quantity sufficient to provide outward cargoes for the ships needed to bring foreign food-stuffs and material for our mills and factories. It constitutes something like four-fifths of the entire weight of stuff we export. Without it, our ships would have to go away in ballast to obtain supplies of wheat, and cotton, and iron ore, and timber. Ballast costs money, whereas coal pays for its carriage. To stop, or even to arbitrarily restrict, the export of coal would be to so enormously increase the freight-cost of our imports as to raise both the cost of living and the cost of industrial production. We should quickly lose both our shipping and our foreign trade; and without the foreign trade half our factories would be idle."

Mr. Taylor proceeds to further point out that a large quantity of the coal exported is eventually used by British vessels, and that a prohibition of the export of coal from these islands would therefore inflict damage on British shipping indirectly as well as directly. He then, however, makes a remark that is curiously crude and illogical compared with the rest of his article. After saying that "it would be extremely interesting to know (and the inquiry which Mr. A. D. Provand, M.P., advocates should enable us to ascertain) how much of our exports of steam coal are for the bunkers of navies of foreign countries that are, or soon may be, at enmity with us," Mr. Taylor adds: "Few people will be disposed to doubt the wisdom of permanently controlling exports of that kind." Now, that is the sort of unconsidered general remark that a journalist with no particular knowledge of his subject would probably make if he were suddenly called upon to write a paragraph on our coal exports. How, may we ask, does Mr. Taylor imagine that we can allow free export of coal for industrial purposes, and at the same time "permanently control" the export of coal for use in the bunkers of other countries' warships? Are we to sell coal in packets marked "for industrial purposes only; if sold for use in navies, the seller will be prosecuted," or how is it to be done? No; if coal exports be permitted, it is impossible to earmark them for any special use; and such an *obiter dictum* as we have quoted only darkens counsel.

The writer points out, while contrasting the situation of the present day with that in 1872-3, what we do not think has been previously brought to notice—namely, that coal is now dearer than—except in temporary periods of strike or accidental deprivation of supplies—it has ever been, *in relation to other commodities;* and that miners' wages are a great deal higher than ever before, if measured by the cost of living. Even taking the price of iron, which is proportionately higher now than other commodities, we find that a Scotch pig-iron warrant "is 73s. to-day; while it was as high as 145s. 6d., and averaged nearly 120s., in 1873." To take another instance of an article immediately dependent for its production on coal, the price of gas to-day is, of course, much lower than it was 27 years ago. A net increase in the charge for coal of 6d. per 1000 cubic feet is obviously a much more serious matter with gas at 2s. 6d. than when it was at 4s.

Another of "the many important facts, the exact significance of which can best be laid before the country by means of a Royal Commission," is the lower cost of production in America as compared with that in England. Mr. Taylor accounts for this difference by saying that "America has not only more

accessible coal, but also more industrious colliers—not by any means better workmen than ours, but working so many hours per week that they can turn out nearly 70 per cent. more coal per man in the year." This, however, is not quite an accurate representation of the facts; the truth being that the larger output per miner in the States is in no small degree due to the general use of coal-cutting machinery. In this country, partly through the supineness of the owners, and partly through the stupid opposition of the men, almost all the coal is got by hand labour.

Mr. Taylor discusses the different and much-varying estimates of the probable duration of our coalfields; but, as he recognizes, the "man in the street" (the lineal descendant of Lord Palmerston's "fat man in a white hat in the twopenny 'bus") is not so much concerned with statistics and the respective accuracy of hypothetical durations, as with the possibility of bringing down prices to a reasonable figure, and, further, with the chances of obtaining other supplies of energy which would make the world less dependent upon its coal resources. Well, Mr. Taylor gives him a needed reminder that he shamefully wastes the coal he has got. "About one-tenth of the coal yielded by our mines is consumed for domestic purposes; and it is computed that not more than about 1 per cent. of what is so consumed is used beneficially." Mr. Taylor then promises him relief in the future, which will come all the sooner if he will be economical in his methods of utilization. Relief, he says, will be obtained from economical consumption, reduced requirements (owing to the freer use of electricity for motive power and illumination, the generating to be done by means of the water power of Cumberland, Wales, and Scotland, as to which we can only say that when a man prophesies you are free to doubt him), reduced cost of production, and utilization of deposits at present unavailable—the two last to be achieved by the increased use of coal-cutting machinery actuated by electricity. The wider adoption of liquid fuel in place of coal for use in the case of locomotives and steamers, is also spoken of as probable. In that direction lies a "potential saving" of 35 million tons of coal annually.

Mr. Taylor concludes with a reference to the influence which America must in future exert on our markets:—

> There is another consideration, mention of which brings one with a shock face to face with the greatest bugbear. The largest consumption of coal is, as we have seen, in the manufacture of iron. It is now highly improbable that this branch of home consumption will increase in future in anything like the ratio of the past, because the United States is taking our place as iron manufacturer for the whole world. We shall, therefore, save our coal, because America will burn more of hers. When Jevons wrote on the Coal Question, he said: "While the export of coal is a vast and growing branch of our trade, a reversal of the trade and a future return current of coal is a commercial impossibility and absurdity." Would he say that now—with American iron in the Black Country, with American steel in Sheffield, with American ship-plates in Scotland, and with American coal in London? If a return current of raw coal from America in persistent volume is not probable, though not a commercial impossibility, a permanent current of consumed coal in the shape of iron and steel may surely be looked for. This will gradually effect an industrial revolution, as we shall have to find employment for our energies in manufactures not so dependent on cheap fuel.

This, as the writer says, is casting forward into the distant future; and it may be remarked that employment in manufactures not dependent upon cheap fuel is not easy to find. But we fully agree that "the conditions of the problem of the immediate future relate rather to the development of the coal resources of the United States than to the exhaustion of those of Great Britain."

AMERICAN ENGINEERING COMPETITION.

(*Concluded from p.* 521.)

We have now to consider the two articles in which "The Times" correspondent deals with the influence of the labour question in this country upon the power of English manufacturers to withstand the onslaught which their American rivals intend to make upon them, not only in neutral markets, but even, as becomes daily more apparent, in the markets of England and Scotland. The supreme importance of this aspect of the question of English *versus* American manufacturers is clearly seen and strongly emphasized by "The Times" writer. "Those," he says, "who control the manufacture of commodities in Great Britain have already found that, with the disappearance of a practical monopoly in some of the world's markets, they have had to attack many problems in quite different fashion. The chief of these has been the labour problem, which is a subject of such paramount importance that it should occupy the best attention in discussing the question of foreign competition." Wherein lies the difference between the labour difficulties with which the English and American employers have to contend; and, if such difference largely favour the latter in their competition with the former, what remedies, if any, lie to the hand of the manufacturers of this country? These are the vital questions. Let us see what light is thrown on them by the articles before us, from which we must take the liberty of freely quoting.

First and foremost, and as the sole considerable factor weighing against English employers, is put the restrictive tyranny exercised by the Trade Unions over the methods of manufacture in this country—a tyranny lessened, but not destroyed, by the struggle of 1898. It is not contended that no labour troubles are experienced on the other side of the Atlantic: "That would be flying in the face of recorded facts, for there have perhaps been more serious riots and bloodshed in recent years in the United States than in Great Britain in connection with labour disputes. The point is that employers have not meekly allowed control to pass out of their hands, nor tamely submitted to restriction of output and to general inefficiency, as the British employer has." It must be remarked that we have ere now heard stories of Trade Union meddling in the States fully as vexatious as that experienced by traders in this country; but, inasmuch as "The Times" correspondent has recently visited a large number of the most considerable of the American engineering works, and testifies from his personal observation and inquiry that these factories at least are not hampered by Trade Union restrictive rules, we must assume that the cases which have been brought to our notice have referred to isolated works or other industries.

There can, indeed, in face of the testimony before us, be no doubt that American engineering masters are not handicapped by the opposition of their men, either direct or indirect, to the adoption and successful working of labour-saving appliances. As the writer of the article says, this of itself constitutes one of the chief advantages possessed by the United States manufacturer; "indeed, *that and free labour are the foundations of American manufacturing success*." He then proceeds to point out the very different state of affairs existing in this country, and his remarks upon the pernicious effects of Trade Unionism, as it is run in the engineering trades particularly, are very exactly in accord with the views always held by the "Journal." He prefaces his indictment of the Unions as trade-hinderers by not unjustly blaming the masters for ever having allowed them to get such a hold upon the management and working of the shops as finally led up to the rebellion of the masters in 1898.

> The recent successes of our foreign rivals are often attributed by employers to the conduct of British working men, or, perhaps, rather, to the Trade Unions which represent them. We hear of absurd yet most damaging restrictions on labour—that one man may attend only to one machine; that a certain low speed of output must not be exceeded; of shop stewards (the secret police who enforce the unwritten laws of the Unions); of demarcation of work which prevents a man of one trade from attempting the most trivial operation outside an exact boundary of his calling; and of many other hampering limitations which retard work and run up its cost to an extent altogether incredible to those who are not acquainted with the inner working of engineering workshops. There is no doubt that all these things exist, though to a somewhat modified degree since the great engineering strike. The employers say the fault is with the men. But it may be questioned whether the masters are not more to blame, for the reason that they are more educated, and their opportunities have been greater. The average working man is not much given to systematic examination of economic problems. He jumps to conclusions; and having once made up his mind, he is very difficult to move. Trade Union methods, on the surface, are for his good; so much so that many persons of education and position, having little practical knowledge of the subject, are led to think the same thing. Employers of labour—with a wider horizon than the working man, and having also that actual experience which the academic student lacks—see in the more objectionable methods of the Unions a danger to trade which must be destroyed, or it will itself destroy manufacturing industry. . . . It is plainly the duty of the masters to meet this common foe—to combine together and make such present sacrifice as may be needed for future gain, to act loyally towards each other without selfish considerations for individual profit. In place of these things, what have we seen? When the great strike in the engineering trade commenced about two years ago, . . . it was said that the engineering firms had not, in recent times, thoroughly supported each other . . . Trade Union tyranny had been allowed to grow up and flourish because the firms had been too jealous or too greedy to help one another loyally. This was what was said. It was a severe view, but, it must be confessed, was not without foundation.

The engineering masters, of course, did hold together, to the surprise of many—the Trade Union leaders not least among them—and won the day. But that is really the first and only occasion on which employers in such a vast industry have combined, completely, loyally, and successfully, to fight the tyranny of the Unions; and we have quoted from "The Times" correspondent at such length because we so fully endorse his plea for united and firm action in the future, in the interests, not merely (nor mainly) of the employers, but of the men themselves and the nation at large. If we are to hold our own as a commercial power—and how else is the existing and rapidly-growing population to find employment?—the rule of militant Trade Unionism must, it is clear, be broken.

> In dealing with this matter, plain speech is a necessity. A custom has grown up of speaking of the Trade Union system as something almost sacred, and that must not be assailed. This had its origin in political considerations; for working men are many, and have votes. It was strengthened by constant repetition, and by the fallacy that all the improvements in the pay and position of workmen were owing to their Trade Societies, instead of being the natural outcome of higher productive capacity, which in turn has been due to invention and the organization of capital, or in other words, the progress of the factory system. If the Unions had remained what they were originally intended to be—Benefit Societies—the regard paid to them would be worthy of observance; but militant Trade Unions have been the chief means of stopping the advance of British engineering industry, and . . . their unreasonable and pernicious rule must be suppressed.

That is the task which lies before the employers of this country; for, although the masters were successful in 1898, and although since then the Union officials have perforce been more reasonable in their actions, it is, we fear, only too true that "the old ambitions are still cherished, the old fallacies are yet unshaken. It only needs a period of recovery, and then a favourable opportunity, for the spirit of two years ago to break out again." Certainly, no one who follows the movements of Trade Union

politics in this country is under the delusion that the old spirit of the officials has been changed by the events of 1898 for a new and sincere desire to be reasonable in their dealings with the masters. What that spirit was, and is, is well illustrated by some quotations from the Official Journal of the Amalgamated Society of Engineers. The first quotation made is from an "editorial" in which a programme was sketched calculated to "assist in that alteration of the competitive system of industry which is now embodied in the rule-book as one of the objects of the Society." The Trade Union Mrs. Partington trying to sweep back the tide of competition between firm and firm with the mop of trade-hampering rules, will look particularly foolish when the tide to be kept in check is the competition of un-hampered manufacturers with the Union-restricted employers upon whose prosperity the dupes of the Union are dependent for their bread and cheese. "Its accomplishment," the editorial proceeds, "may, and we believe will, involve the registering of Trade Union desires by the force of legal enactment, and the better utilization of public bodies than has yet been endorsed. For labour-displacing machinery means an ever-increasing obstacle to be faced." It is the last sentence that is the most significant and revealing. Nothing can well be more injurious to the prosperity of this country than the hostility of the labour organizations to labour-saving appliances, or the fatal absurdity of insisting upon skilled workmen being employed to manipulate machines capable of being tended by youths or unskilled workmen. Yet this is the declared policy of the A.S.E., as the following quotations clearly show.

Referring to a dispute at Earle's shipbuilding and engineering works at Hull, the Journal of the Society said: "Our members, after a strike maintained with a pertinacity beyond all praise, have forced recognition of the principle that machines which supersede hand-skilled labour should be manipulated by skilled and full-paid men." Again: "The machine question has also been prominently to the front all over the [Glasgow] district. . . . There seems to be a determination on the part of employers to put labourers to this class of tools." Yet once more: "With a view to checking the employment of labourers on mechanics' work, the District Committee drafted the appended restrictive bye-law." Furthermore, it is of course notorious that not only must none but a skilled workman be employed to work the machine that replaces the need for his skill, but that the said skilled workman is forbidden by his Union to do more than a limited amount of work with the machine he is so expensively put to manipulate. It is only necessary for the reader to recall some of the points noted from the previous articles of "The Times" correspondent, in which he especially referred to "unskilled" men in the American shops he visited working their machines for all they were worth, and making suggestions for increasing their efficiency, to realize the tremendous handicap put on the English employer by the short-sighted, irritating, foolish policy of the A.S.E., the Boilermakers' Society, and others of the same kidney.

The idiotic extremes to which the Union rules governing "demarcation" of work have so often run are next held up—and very properly—to the scorn of all reasonable and practical men. The dispute which arose between the two Societies just named as to whether some water-tube boilers which were being made by Thorneycrofts should be deemed to be the work of fitters to whom all work on pipes belonged, or to the Boilermakers, who declared that A.S.E. men should not touch boilers, which led to weeks of delay, and finally to a strike, is instanced, only to be surpassed by another case of even greater absurdity, taken from the columns of "Engineering." The dispute occurred between shipwrights and ship-joiners. Both these trades work in wood on the structure of a ship, each doing planing, &c., with much the same tools. "A line of demarcation is drawn by the thickness of a plank or board, so that the difference of $\frac{1}{8}$ inch may determine whether Sam the shipwright or Jim the joiner may claim the job. On one occasion a board had to be dealt with which was a little over the limiting thickness on one edge and a little under it on the other. It is disappointing to learn that so pretty a case for argument was swept aside by an unimaginative employer, who said that he did not care whether it was a shipwright's board or a ship-joiner's board, but if someone did not look sharp and plane it up he would discharge both sides, and get non-union men." One would really have credited the British workman with a sufficient sense of humour (to say nothing about common sense) to prevent the occurrence of such ridiculous—but none the less costly—squabbles, were it not that such cases, though perhaps extreme, are by no means isolated ones. As it is, these irritating and most expensive restrictions constitute another handicapping burden on the English manufacturer in the competition race.

Instances are quoted which help one to realize the expensiveness of the policy for which the Unions contend—the policy already referred to of obliging employers to give the minding of machines to skilled men. These instances occurred at the time of, and after, the 1898 struggle. A firm had been compelled by the Society to hand over two copying-lathes to two turners, each earning 35s. per week. When the strike came, one labourer at 24s. per week turned out more work than the two Society men together. Saving, £2 6s. a week, and more work done. "Another firm found it took a Society man 190 hours to plane a lathe-bed. A promoted labourer under a non-union foreman did the work in 135 hours," or (say) in seven days less time than the skilled workman. "In another case, a turner had set a piece of work in the lathe which would go automatically for some time, and he therefore left the machine at work, and began to sharpen his tools. The shop steward told him he must stop either his lathe or the grinding of tools."

As to piece-work, which is emphatically discouraged by the rules of the A.S.E., "The Times" correspondent recalls what he had said on the point as regards American customs and workmen. He says:

> In nearly every engineering factory I visited during my recent tour in the United States I found the system of piece-work followed to the fullest extent possible. Its effect is remarkable . . . . Instead of being checked by popular opinion, or the feeling of the shop being against hard work, the best worker is looked on with respect, whilst the loafer and larrikin find existence impossible . . . . In some instances, day wages are preferred by employers in the United States, not often by the men; but in that case the greatest care is taken in organizing the staff of foremen . . . . The American foreman is never a "men's foreman" . . . . He feels that the efficiency of the shop is on his shoulders, and moreover, if he does not get a good result some one else will take his place. Of course there is no uniformity of payment in America such as is enforced by Trade Union rules here. A man gets just what he is worth; and it may be said that if he is not worth more than the generality of mechanics receive in England and Scotland, he is hardly considered worth keeping at all.

Reading all that we have quoted with the thought ever present of its bearing upon the coming struggle for industrial supremacy between the two great English-speaking nations of the world, can the future be look forward to with unruffled equanimity? We have not yet lost faith in the vitality and resource of the mother country; but every pennyworth of it will be needed in the coming years if she is to make a good fight for her position as the first nation in the world's markets. We fear that the working classes will have to learn a bitter lesson from adversity before the manufacturers will be able to fight their competitors with any strong chance of success. Would that the letters of "The Times" correspondent, which have formed the groundwork of these articles, could be read by every Trade Unionist as well as by every employer in the country. That is, we know, an idle wish; but it is within practical limits to hope that those letters will before long be published in collected form. They have been scattered over too many weeks, or rather months, when the public mind has been otherwise engaged, to attract the attention they deserve.

PERSONAL.

Mr. William T. Lane, of the Oxford Gas Company, has just been appointed to fill the position of Assistant-Manager of the Bombay Gas Company, in succession to the late Mr. Reginald A. Gandon.

As will be seen by our "Notes from Scotland," Mr. Forbes Waddell, of Forfar, has been appointed Manager to the Broughty Ferry Gas Commission, in succession to his elder brother, Mr. A. Waddell, who has gone to Dunfermline.

Mr. G. Marsham has resigned his position as Chairman of the Maidstone Water Company on account of pressure of public duties. Mr. H. W. Tyrwhitt-Drake has, with the approval of the Directors, undertaken the chairmanship of the Company.

Members of the Middlesbrough Corporation Gas Committee recently waited upon Alderman Hugh Bell, with the view of inducing him to withdraw his letter of resignation as Chairman of that Committee. He thanked them for their kind expressions, but replied that, acting under medical advice, he could not see his way to reconsider his decision.

A paragraph went the round of the papers last week, regarding the singular circumstances under which an Englishman had become the winner of the 100,000 fr. (£4000) prize in the Paris Exhibition lottery. We learn that Mr. George D. Bailey, of Forest Gate, Chief Clerk at the Beckton station of the Gaslight and Coke Company, is our compatriot who is to be congratulated on this remarkable piece of good fortune.

OBITUARY.

Alderman Charles Ellis, of Maidstone, died last Sunday week, at the advanced age of 76 years. He took a leading part in the public affairs of the town; and among the numerous public appointments which he had held was that of Chairman of the Water Company—his tenure of the office lasting from 1885 to 1897. His retirement took place at the time of the deplorable typhoid epidemic.

We regret to record the death, early last Friday morning, from an attack of dysentery, of Sir John Bennet Lawes, whose name is inseparably connected with the progress of agricultural science during the past sixty years. Deceased was son of the late Mr. John Bennet Lawes, of Rothamsted, in Hertfordshire, who died in 1832. On succeeding to the estates in 1834, he at once commenced a series of experiments with the view of obtaining explanations of certain imperfectly understood points in agriculture. In 1840 and the following year, similar experiments were conducted in the field; the outcome of which was the taking out of a patent in 1842 for treating mineral phosphates with sulphuric acid, which marked the beginning of the manufacture of artificial manures. In 1843, Dr. (now Sir) J. Henry Gilbert, formerly a pupil of Liebig, became associated with Mr. Lawes;

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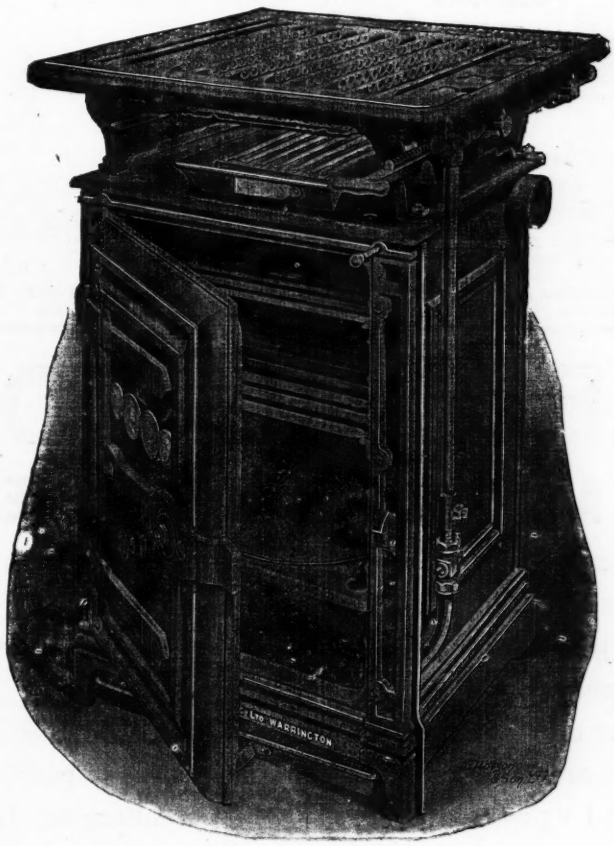

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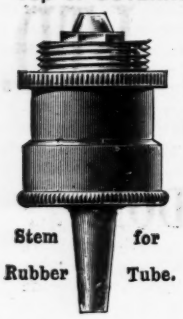

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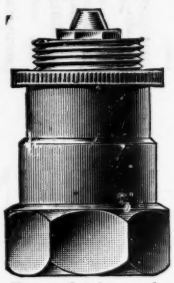

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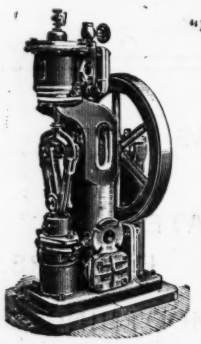

Fig. 705. "SINGLE RAM" STEAM-PUMP.

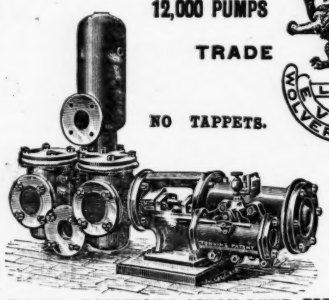

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

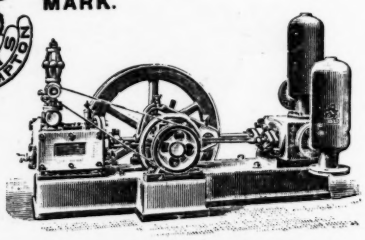

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

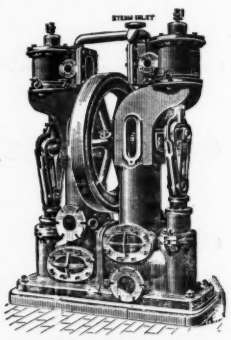

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

A NEEDFUL NOTICE

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and the foundation of the Rothamsted Agricultural Experimental Station dates from that year. It is impossible to indicate here, however briefly, the scope of the investigations carried out there. Suffice it to say that the relative values of sulphate of ammonia and nitrate of soda as sources of nitrogen, the composition of rain and drainage waters, and the utilization of town sewage, were subjects which were fully inquired into. Most of the results of the Rothamsted experiments have been given to the world through the medium of the "Journal of the Royal Agricultural Society" from the year 1847 onwards; and about 130 separate memoirs or papers have been published. Through the munificence of the founder of the station, the experiments will not cease by reason of his death; he having, by a trust deed, executed in 1889, set apart £100,000, together with the laboratory and certain areas of land, for the prosecution of the investigations in perpetuity. Deceased, who was born in 1814, was created a baronet in 1882.

NOTES.

The Storing of Plans.

The storing of plans and tracings is an important consideration in large engineering works. The "Engineering Record" describes the system adopted at the new offices of the Union Iron-Works, San Francisco, in connection with which the problem received special attention. In order to provide safe and convenient storage for tracings, a fire-proof vault was constructed from the basement. It serves as the safe deposit for every floor of the building, taking the tracings at the second-floor level. All the old drawings had been kept in chests of drawers. There were 60,000 sheets; and they were in a deplorable state. It was decided to store tracings in rolls, with an elastic band on each end to prevent telescoping. They were then to be packed in dustproof paper cylinders. The standard size of sheet used was 27 in. by 40 in.; with half and quarter sizes. There were exceptional sizes, of course; but wherever possible the standard sizes were used, and the cases were made 30 inches long and 3 inches in diameter. For the storage of these cylinders, galvanized iron binns were made, with grooves ¼ inch larger than the cylinders. All the stock of tracings had to be classified and indexed. First comes the generic title, which is alphabetical, as Accumulators, Agitators, &c., under "A;" and Boilers, Bunks, and so forth, under "B." The largest classes, such as Boilers, were subdivided into classes for Stationary Boilers, Marine Boilers; and there are other classes under proper names. Sheet numbers are given to the drawings, with alphabetical letters, plenty of gaps being left for filling up. The tracings are stamped as finished, with the general description and number. They are then handed over to the indexers, who copy these particulars on a card which is duly filed. Tracings are made over a glass plate which can be lighted from beneath so as to show up fine lines. Only blue prints, taken from the tracings, are issued to the works. It is to be understood from this that the original drawings are only in pencil—never finished in the old laborious and expensive style.

Power from the Waves and Tides.

With visions of exhausted coal supplies, says a writer in "Cassier's Magazine," even though the end be far off, come thoughts of power from sources other than coal—from wind and water, and from the restless ocean waves and tides. Of water power there are a goodly number of important installations, principally in the United States, where electric power distribution from them over comparatively long distances has reached a high state of development. In Great Britain, on the other hand, power from waterfalls is a scarce commodity, and not much is to be hoped for in this direction; so that there is something of interest in a recent forecast of the country, with every hill or other point of vantage studded with huge windmills for generating electricity, to be subsequently distributed to manufacturing centres. Many years, however, would have to elapse before coal would become sufficiently dear to make such a scheme worth considering in a practical way. Wave motors and tide-power schemes have been almost endless in number. The former have, in a few instances, been used for light pumping work at seaside places; but such pumping outfits have been very far from demonstrating that the wave motor could ever be seriously considered as a prime mover where large powers were demanded; in fact, the wave motor is little better than a toy. As to power from the tides, there is little to be said, except that much money has been wasted in vain endeavours to turn it to practical account. The tide-power scheme will probably always be alluring, and also disappointing. The disappointment comes from the fact that very few people seem to take the trouble to calculate how much water and how considerable a fall are required to give any useful amount of power. A horse-power for a day of ten hours, for example, would require something like 120 tons of water falling from a height of 100 feet; so that a 500-horse power factory would need 60,000 tons of water at a 100-foot head. On the basis of 36 cubic feet of water to the ton, there would be upwards of 2 million cubic feet of water, which would make a fair-sized pond—say about 1000 feet long, 200 feet wide, and 10 feet deep. In these few figures there is something that may help to open the eyes of the tide-power plan inventor, and of those who are in the habit of putting money into such things.

The Intrinsic Brilliancies of Various Lights.

Some interesting particulars as to the general effect of light on the eye appeared recently in the "Iron and Coal Trades Review." As regards particularly the deleterious effect of rival illuminants upon the eye, the following statement—by no means favourable to the electric lamp compared with gas—may be extracted: Although a measure of intrinsic brightness is obtained by dividing the candle power of any light by the area of luminous surface, this latter quantity is very difficult to determine accurately, since (with the exception of the incandescent filament) no source of light is anywhere nearly of uniform brilliancy over its entire surface. For the sake of comparison we can, however, draw up an approximate table by assuming equal brightness over the generally effective lighting area of any light. It should be distinctly understood that the values tabulated are only average values of quantities, some of which are incapable of exact determination and others of which vary over a wide range according to conditions.

Intrinsic Brilliancies in Candle Power per Square Inch.

Source.	Brilliancy.	Notes.
Sun in zenith	600,000	Rough equivalent values, taking account of absorption.
Sun at 30° elevation	500,000	
Sun on horizon	2,000	
Arc light	10,000 to 100,000	Maximum about 200,000 in crater.
Calcium light	5,000	
Incandescent electric lamp	200-300	Depending on efficiency.
Enclosed arc	75-100	Opalescent globe.
Welsbach light	20 to 25	
Kerosene lamp	4 to 8	Very variable.
Gas-flame	3 to 8	Very variable.
Candle	5 to 4	
Incandescent (frosted)	2 to 5	
Opal shaded lamps, &c.	0·5 to 1	

The striking thing about this table is the enormous discrepancy between electric and other lamps of incandescence and flames of the ordinary character. The very great intrinsic brilliancy of the glow lamp is particularly noteworthy, and (from the oculist's standpoint) menacing.

Expeditious Method of Making Embankments.

A recent number of the "Engineering Times" contained a description of an expeditious method of making embankments, used in the construction of the Canadian-Pacific Railway, in places where abundant water power was at hand, and also immense banks of gravel or morainic material. The water was brought down from the streams above under great pressure, and with it the gravel and boulders were washed into large sluices, which carried them to the points where the filling was to be done. The water was then allowed to drain away, leaving the gravel thoroughly settled in the new position. By means of logs laid in rows one above the other, the filling was confined within the proper limits, and thus the embankment rose, tier above tier—the slope being kept well within the angle of repose, and the logs soon sprouting and forming a network of roots, firmly binding the mass together. Mountain Creek is the point at which a large amount of filling has been done on this plan in a most successful and economical way. Water is obtained from the creek some two miles above, and is led down in a flume, 2 feet high and 4 feet broad, to the flume-box, which is 206 feet above the railway track. From this point an iron pipe 14 inches in diameter leads the water to the monitor, which is provided with nozzles ranging from 3 to 6 inches in diameter. The small-sized nozzles are used for breaking up the mass of gravel; while the larger ones furnish an increased volume of water to flush the sluices. Boulders 18 inches in diameter are readily moved without assistance; but two men with hooks are constantly on the look-out to clear any obstructions. The sluice, which has a grade of about 1 in 10, conveys the material beneath the railroad track and deposits it in a great pile at the centre of the area being filled. From this point it is gradually washed down until stopped by the row of logs at the edge, which, however, allow the water to flow off freely. The sides are made to slope at an angle of 37° 40′. The cost of this filling is about one-half that of the ordinary method; but it is here carried on under great disadvantage. Not only must the work be entirely suspended between October and June, but the sluices and fixtures must be taken up in order to prevent wreckage by the avalanches; and so each spring the work must practically be constructed again. Nine men in all are required to conduct the filling—one at the monitor, two to keep the sluices clear, and six to prepare and lay the logs at the edge of the filling, and to level off the material as it falls. The total filling at this point will aggregate 300,000 cubic yards, of which 225,000 yards were put in place between June, 1897, and June, 1899.

The Value of Gas-Retort Carbon.—According to the Spanish journal "Revista Minera," there is a great demand for the above-named material, chiefly for the manufacture of carbons for electric light purposes. Prices recently increased, and seem likely to continue to do so, as there is talk of a combination among gas manufacturers to raise the figure to 125 pesetas per ton in gold—the existing one being 70 to 80 pesetas.

THE INTERNATIONAL GAS CONGRESS.

PALAIS DES CONGRÈS, PARIS EXHIBITION,

SEPTEMBER 3 TO 5, 1900.

M. THÉODORE VAUTIER, PRESIDENT.

By Saturday night last, the greater proportion of the members attending the International Gas Congress this week had gathered in Paris. The President (Mr. J. W. Helps, of Croydon) and a few of the party of the Institution of Gas Engineers travelled over on Friday by the Folkestone-Boulogne route; and they had as companions on the journey Mr. George G. Ramsdell, the President of the American Gaslight Association, and other members of the substantial contingent (distance considered) contributed by our friends across the Atlantic. The remainder of the Institution members and ladies who had registered their "*adhésion*" (as the French say) to the Congress travelled over on Saturday; and the same day (*viâ* Newhaven-Dieppe) came the President (Mr. T. O. Paterson, of Birkenhead) and the party of the Gas Institute. Little delays on the journey and a slight accident to the machinery of the steamer conveying the latter across the Channel were responsible for them alighting in Paris something like two hours after the time they were due. Altogether, the contribution from England numbers 68, with an equal division between Institution and Institute. Germany surpasses us considerably in numbers; the Dutch and the Italian Associations follow close on our heels; and America is the fifth best, with about 40. The strength of Switzerland, Austria, Belgium, and Russia follow in this order; and other attendants from divers parts will make the foreign representation a little short of 500, which number our hosts—the Société Technique du Gaz en France, upon whom has fallen the brunt of the work of organization—will raise to between 1000 and 1100.

The technical work of the Congress will extend over Monday, Tuesday, and Wednesday; and very full days of close attention the Organization Committee intend claiming. Thursday and Friday will be devoted to the Exhibition, the Clichy Gas-Works of the Paris Gas Company, and other excursions. With regard to the Clichy visit, the Company have, with their usual munificence, undertaken the whole of the arrangements, and have placed at the disposal of the Congress Committee a very fine steamer for the conveyance of a large proportion of the members by way of the Seine.

Although the proceedings connected with the Congress proper did not actually start before nine o'clock yesterday morning, there were on Saturday meetings and an important evening function which ushered in the more imposing proceedings of this week, and which gave one another insight into the thoroughness with which our friends across the Channel do these things, as well as the enjoyment of a further taste of their generosity and warmth in the reception of their visitors. In the morning, the annual meeting of the Société Technique was held; but (as will be seen by the report which appears elsewhere) only business of a formal nature was transacted. Then in the afternoon there was a meeting of the Congress Organization Committee, at which about fifty gentlemen were present. We cannot name all, but among them were men whom the gas profession universally honour and esteem. There were seen Bunte, von Oechelhaeuser, and Coze uniting heartily with Vautier, Delahaye, Salomons, Lebon, Helps, Ramsdell, Brackenbury, and many others in completing the preparations and programme for this week's work. M. Théodore Vautier, the President of the Société Technique and of the Organizing Committee, occupied the chair; and, by virtue of his office, he will, of course, be the supreme head during the Congress. But there is some talk of dignifying the Presidents of the different foreign organizations represented by installing each in the chair for a brief period during the sittings. M. Vautier opened the Committee's conference on Saturday by extending to the Presidents and Secretaries of the various Societies a very hearty welcome. Then the necessary arrangements were made for facilitating the management of the meetings; and the order of procedure was settled upon. Secretaries were also appointed for immediately reporting and preparing a *résumé* of the speeches made during the Congress; and, in such a polyglot assembly, this will conduce to a freer interchange of opinions. The gentlemen who had the temerity to undertake this arduous duty were MM. Bouvier, Godinet, and Visinet, representing the French section; Mr. C. E. Brackenbury, the English; Dr. F. Schœfer and M. Weiss, the German; Baron François Lucifero, the Italian; and MM. Bolsius and Van Heede, the Dutch and Flemish. After this the Committee adjourned; and the Secretaries conferred together.

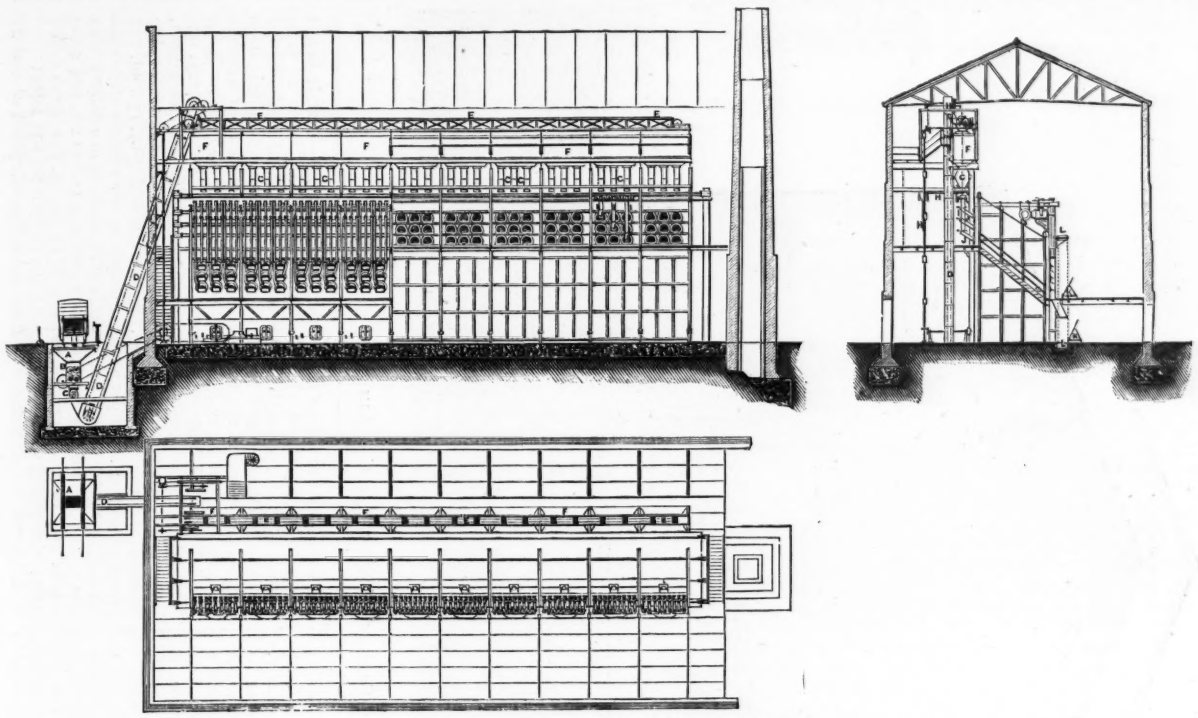
In the evening, the annual dinner of the Société Technique was held in one of the gorgeously gilded and decorated saloons of the Hôtel Continental. Enhanced lustre and consequence were given to the ordinary function by the issue of invitations to the foreign Presidents and the leading delegates already arrived in Paris. To the right and left of M. Vautier were spread the guests, and a few whom the head table would not accommodate were disposed among the members of the Société Technique; and all were very charmingly entertained. Altogether about 200 sat down. Good feeling and exhibitions of international courtesy were the predominant features of the occasion. The banquet was *recherché;* and the after-speeches were framed in elegance and neatness of expression. The toast-list was opened by M. Vautier, who, in well-chosen language, said he hoped that every member of the foreign societies would combine with the Société Technique du Gaz in their endeavour to increase the cordiality of international relationships, so that the Congress might result in the general advancement of the gas industry. He did not leave this to individual initiative; but he had organized, by means of his Society, the best means of obtaining a world-wide representative Congress. He had received 1100 promises of attendance at the international meetings, of which number no less than 500 were from abroad. He thanked most heartily the various technical societies who had conduced to such a highly satisfactory result. He was also very glad to find that not only did they signify their support of the idea of an International Gas Congress by their presence, but that they had also contributed largely to the papers to be read at the ensuing meetings. The principal guest, M. Jariel (who is not only an Engineer of considerable repute attached to the Ponts et Chaussées, but is also a physician of high standing), emphasized the importance of this first International Gas Congress. Other speakers following were: M. Victor Krafft, who, in himself, claimed a certain amount of cosmopolitanism, inasmuch as he was representing the gas industry in Italy, although not a native of that country; M. Th. Verstraeten, as representing the gas industry of Belgium; M. Gariel, the Organizing Director of the Congresses being held this year in Paris; and M. Bouchy, of the Paris Gas Company, who spoke of the value that such an international assembly would be in solidifying the foundations of the gas industry, and the feeling of cordiality which it extended among members of the various nations. The same point was also emphasized by M. Alfred Lebon (*fils*), the President-Elect of the Société Technique; by M. Maurice Piaton, the new Vice-President; and by M. Lebon (*père*). A word from Austria, in similar strain, fell from the lips of M. Nachtsheim. These gentlemen having spoken without any previous arrangement, the President of the Institution of Gas Engineers (Mr. Helps) only too gladly added a few words expressive of the sympathy and kindly feeling which he and his English brethren entertained for the members of the gas profession in other countries. Then speaking of gas engineering generally, he said he thought few would deny that England was the nursery or boarding-school of the gas industry; and at one time an engineer of any other country, if he wanted to know the latest methods of gas engineering, would consider he had failed in his duty if he did not, at any rate, pay a visit to one or two English gas-works. But things were changing. Those who had been taught were now becoming the teachers; and during recent years not a few English engineers had been to the Continent, and some, who had had the opportunity, to the other side of the Atlantic, and had returned having learnt very much more than those did who journeyed to England in the early days. The time had, he repeated, arrived when English gas engineers had to go abroad to learn the industry of which they were once the teachers. He congratulated the President and his colleagues on the splendid International Congress they had inaugurated. It would have the effect not only of teaching them, but of cementing together the profession throughout the whole universe. Whatever might be their differences of opinion with regard to political questions and matters of the kind, they were there meeting on a common platform to improve their knowledge of the industry of which they were devotees. He thanked the Société, on behalf of English engineers, for the opportunity given them of meeting their friends from so many countries in "the splendid city of Paris." Mr. G. G. Ramsdell, for the American delegates, similarly thanked M. Vautier and his colleagues, and said he regarded the Congress as one of the most important steps ever taken for the advancement of their common industry. He spoke of their experience of Gas Associations in America, and of how much they contributed to the progress of the industry; and he concluded "by drinking to the health of the honoured President of the Congress." The speeches were frequently interrupted by marks of earnest approval by the audience; and throughout a fraternal spirit was infused into the proceedings.

One of the early papers read yesterday morning was that prepared by Mr. C. E. BRACKENBURY. It was entitled—

INCLINED RETORTS.

Since the practical introduction by M. Coze, to whom all engineers and workers in the world-wide gas industry owe a debt of gratitude, of the principle of carbonizing coal in inclined retorts, the system has rapidly been adopted all over Europe. Within the last ten years, in England alone, nearly 30,000 metres (98,400 feet) of inclined retorts have been put up, representing in value no less a sum than 17,500,000 frs. (£700,000), or an average yearly expenditure of 1,750,000 frs. (£70,000), without including the capital spent on the retort-house buildings. To have brought about, in spite of many obstacles, such a large capital outlay, the benefits arising from the adoption of this method of carbonization must have been considerable from all points of view—commercial, technical, and labour.

The annexed drawing of an installation of ten beds of inclined

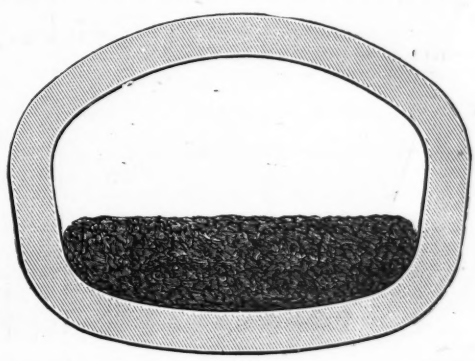


ORDINARY SETTING OF INCLINED RETORTS.

retorts may be taken, in its general features, to represent the lines now usually followed in England, though, of course, mechanical details and arrangements vary according to taste, experience, and local considerations. The coal is discharged into a tank or hopper A, from which it falls into a breaker B, either of the jaw or roller type, the former being perhaps more usual on the Continent, and the latter in England. Underneath the breaker may be used the revolving feeder C, the nature and advantages of which were pointed out in the paper on "Stoking Machinery," which the author had the honour of presenting to last year's meeting of the Société Technique de l'Industrie du Gaz en France.* The elevator buckets D, receiving their regular supply, lift the coal and throw it on to a push-plate conveyor E, which fills the overhead storage tank F, running continuously the whole length of the bench. This storage tank is best made large enough to contain a 24 hours' supply of coal, so as to avoid the necessity of working the accessory machinery during the night time, and to give a surplus in case of need. Underneath the storage hopper, and in a direct line with each vertical tier of retorts, is placed a measuring chamber G, of the form shown, the upper door of which communicates with the storage hopper, while the lower one allows the coal, when required, to pass into the retort. These two doors are connected to a lever H, in such a way that pulling it from its normal position opens the bottom door, closing at the same time the upper one, which shuts off the coal from the tank above. The act of returning the lever to its place closes the lower door, opens the upper one, and thereby refills the measuring chamber. These chambers, as their name indicates, measure the exact amount of coal required for each retort, and can be regulated as desired. They are best fitted with a sure-feed arrangement of an automatic balance and flap-plate, which prevents the operator from shutting off the descending coal until the whole of the charge has passed into the retort, and renders it impossible for any coal to leave the chamber before the top door has been completely closed. This makes the full charging of the retorts independent of the goodwill of the worker, gives the management the security that the desired quantity of coal will be carbonized, and reduces the amount of superintendence required. A light travelling shoot I is provided for each tier of retorts, fitted with baffle-plates for ensuring that the speed of the falling coal will be the same for the varying distances it drops. J is the shoe, which is placed in the charging retort mouthpiece, and to which may, if desired, be added a spring door for further controlling the velocity of the coal entering the retort. Such additional check is sometimes of value where very varying qualities of coal are used, or where cannel or boghead is also to be carbonized. On the drawing stage is placed a moveable shield K, to protect the men from the hot coke falling from the retorts, and which also serves to divert it through suitable openings in the floor on to the conveyor and quencher below, lettered L. This is a rough outline of up-to-date English practice; and some further points in connection with it may be touched upon.

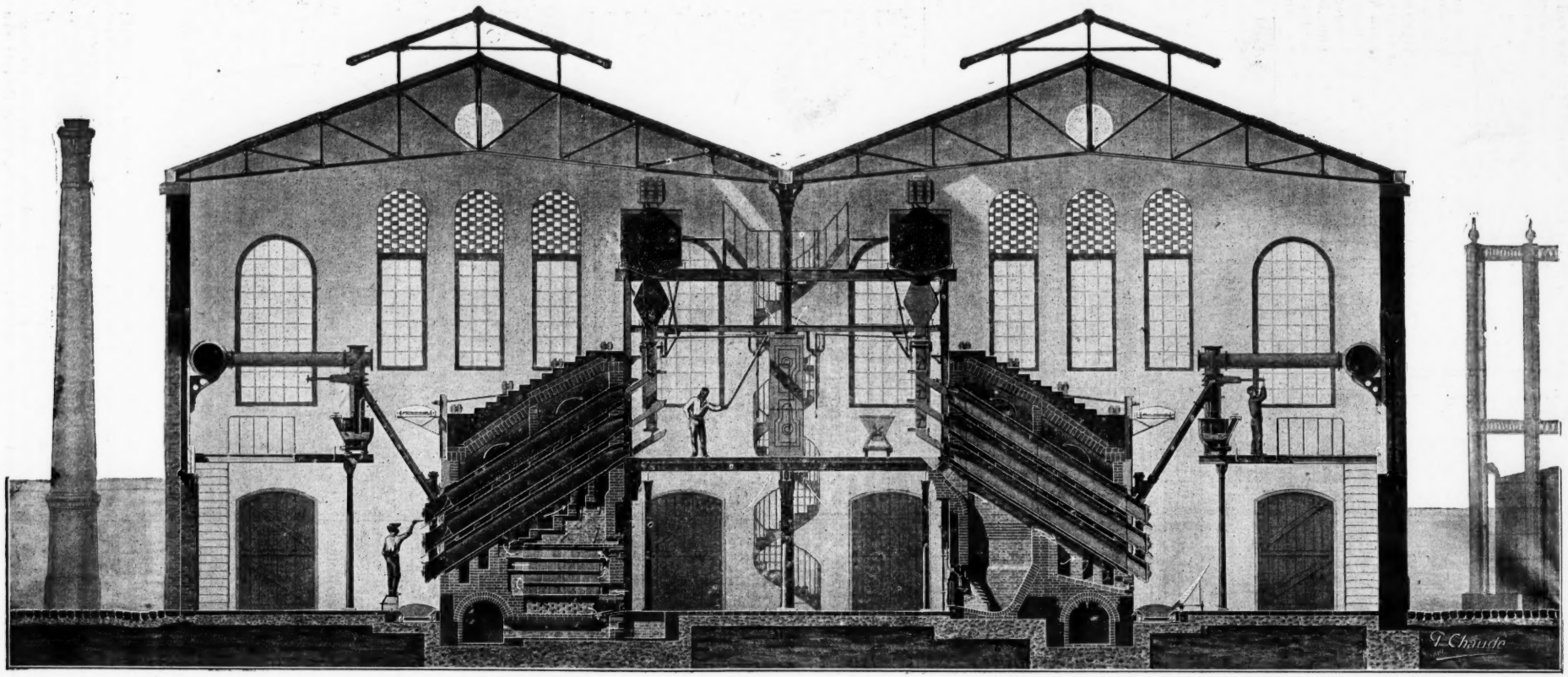
The retort-house itself, for a single bench of retorts, is generally covered with an ordinary trussed roof; while for a double bench, with the charging floor in the middle, a semi-circular girder roof seems more advantageous, as it leaves uninterrupted space for conveying machinery and tanks, &c. The measurements of a suitable house for the latter arrangement would be about 30 metres (100 feet) in width, and about 20 metres (65 feet) from the ground line to the underside of the girder. The good ventilation and lighting of such a retort-house are of the utmost importance; and these points deserve to receive their full meed of consideration.

The dimensions given are for arches containing retorts 6·1 metres long (20 feet). Is this the best length for inclined retorts in large works? The writer believes that experience has fully shown this to be the case. It was natural and proper enough in the early days of inclined retorts to feel one's way with a length of only 3·5 metres (11 ft. 6 in.), increasing this, as experience gave confidence, to 4·57 metres (15 feet), and eventually to 6·1 metres (20 feet), which last may be taken as the now usual length in England. It has been argued that such a length has a deteriorating effect upon the illuminating power of the gas, and also that it presents undesirable difficulties in the way of repair. Both these contentions have been nullified by actual experience, and, if substantiated, would apply with equal force to a retort of the same length placed horizontally. The advantage of carbonizing 350 kilos. (7 cwt.) of coal per charge and per retort, with the same machinery and with the same amount of labour expended, as for only 250 kilos. (5 cwt.), is sufficiently obvious and great to outweigh the most severe difficulties.



The form of the retort is a matter of supreme importance; but here, also, past experience serves to guide one to the best and most suitable. It depends largely on the chief character of the coal used, and should be designed to suit accordingly. With Durham coal, or coal that swells to any extent during carbonization, the essential feature is to give sufficient height to the sides of the retort to prevent the expanding charge from jambing against the crown. Another point the author thinks useful, is to give a slight inclination to the sides of the retort, instead of making them vertical, so that in rising the coal might, as it were, free itself from the retort, which would thus tend to

* See "JOURNAL," Vol. LXXIV., p. 109.



SETTING OF INCLINED RETORTS FOR SMALL WORKS (SYSTEM OF M. DERVAL AND MESSRS. GRAHAM, MORTON, AND CO., LIMITED).

increase the facility of discharging the coke. The preceding section of such a retort will serve to illustrate this.

A curved bottom to the retort, though to a slight extent impeding the easy drawing of the coke, adds considerably to its strength, and thus to its life, particularly in the case of a retort 6·1 metres long (20 feet). Provided a sufficient taper, which the author believes to be about 150 mm. (6 inches), be given to the retort, he thinks that the labour of drawing will be reduced, and rendered more automatic than is sometimes found to be the case with parallel, or with but slightly tapered, retorts. As there has been a tendency to increase the length of the retorts, so has there been to augment the angle at which they are placed, from the original 29½° to 33°, and even more.

The usual number of retorts in an arch is nine; though in England, for some reason or other, there seems to have been some hesitation in adopting this general Continental practice. For large works, one might think that the setting of even twelve retorts in three vertical rows in a bed—thus utilizing the same charging apparatus for still more work—would prove a success, especially as such a number has been satisfactorily worked in horizontal arches. Continental gas engineers are still ahead of their English colleagues in many points, principally, the writer thinks, in regard to the admirable design and construction of their furnaces, due partly perhaps to their greater readiness to spend capital on such plant, owing to dearer fuel, and with a view to increased economy of working and longevity of life.

To compare the capital cost of inclined retorts with that required for horizontal arches and for stoking machinery is exceedingly difficult, owing to the variety of circumstances—the differences in the character of the work done, and in the cost of the labour and materials employed in each case. There are in any such comparisons so many pitfalls—any one of which might be sufficient to destroy their value and accuracy—that it is not easy to arrive at an absolutely unimpeachable basis of fact. The author, for example, has heard of an installation of inclined retorts reported to cost as low as 7000 frs. per 1000 cubic metres of gas per day (£7 17s. 6d. per 1000 cubic feet), and of another to cost as high as 17,250 frs. (£19 8s. 1d. per 1000 cubic feet). Installations of horizontal arches with stoking machinery, put up under similar general circumstances as in the two cases cited, cost, respectively, about 5000 frs. and 13,130 frs. per 1000 cubic metres of gas made per day (£5 12s. 6d. and £14 15s. 5d. per 1000 cubic feet). In yet another instance, the comparative cost of inclined retorts, and horizontals with stoking machinery was reversed; the former costing approximately 11,000 frs. per 1000 cubic metres of gas made per day (£12 7s. 6d. per 1000 cubic feet), compared with 13,000 frs. (£14 12s. 6d.) for the latter.

Likewise the economy resulting from the adoption of one or

other of the two systems is extremely variable; but, generally speaking, their respective merits may be summed up as follows:—

(*a*) *With inclined retorts*, in normal cases, a saving of from 60 to 75 per cent. may be made in the number of men employed; and the cost of carbonizing per 1000 kilos. of coal, excluding depreciation and interest on capital, may be as low as 1 fr., or, reckoning 300 cubic metres (10,600 cubic feet) as the gas made by this quantity of coal, 3·33 frs. per 1000 cubic metres of gas.

(*b*) *With horizontal retorts and stoking machinery*, a saving of from 45 to 60 per cent. may be made in the men employed; while the cost of carbonizing per 1000 kilos. of coal, excluding depreciation and interest on capital, may be 1·30 frs., or 4·33 frs. per 1000 cubic metres of gas made per day, or 1 fr. more than with inclined retorts.

Leaving, however, figures on one side, there cannot be the slightest doubt that putting coals into horizontal retorts by stoking machines, however perfect and however suitably arranged, must of necessity be harder work than letting it drop automatically into inclined retorts. In the former case, there is the same coal breaking, elevating, and conveying plant as for the latter, but with the addition of machinery for raising the power required by the stoking machines—be it hydraulic or compressed air. It is to be remembered, also, that for working a set of horizontal retorts 6·1 metres (20 feet) long, four machines in all are required, with their dozen or so levers; their demand for some amount of skilled labour; their endless wear and tear; and the continual chance of break-down. With inclined retorts, on the other hand, there is but one lever to work for each retort; and, providing the breaking, elevating, and conveying machinery be in duplicate, risk of break-down is completely avoided. It must not be forgotten, moreover, that a greater make of gas per unit of floor-space can be obtained by placing retorts at an angle instead of horizontally; and experience has also shown that the wear and tear of inclined retorts is less than of horizontal.

There is no need, however, as some have done, to advocate one system to the total exclusion of the other; as for existing horizontal retorts and exceptional cases, the successful and admirable stoking machines of Mr. West and Mr. Foulis are most useful. But for new work and the large majority of instances, the writer believes the superiority of the inclined-retort system to be unquestionable.

Yet one other point should be borne in mind in considering the question of inclined retorts *versus* stoking machinery, and that is the suitability of the former for small or medium-sized gas-works. To work power stoking machinery to the best advantage, it is essential to have a sufficient number of retorts at its disposal, as one pair of machines can deal with between 200 and 300 mouthpieces. It is also true, of course, that for the most economical results in carbonizing with inclined retorts, a certain number of beds should be at work; but, on the other hand, it is quite practicable and feasible to have but one or two arches in service. Where there are only two or three beds in action, it is customary to allow one man per bed and per shift. This results in about 6000 kilos. (say, 6 tons) of coal being carbonized per man per twelve-hour shift.

To extend still further the applicability of the inclined-retort principle to very small works, M. Derval, of Paris, in conjunction with Messrs. Graham, Morton, and Co, Limited, of Leeds, has patented the arrangement shown herewith, and drawings and a model of which are on view in the Champ-de-Mars. In addition to several unique features in the design of the furnace, principally in there being two admissions of heated secondary air, arranged so as to secure the regular and sufficient heating of the lower, as well as the upper, end of the retort, the chief aim has been to reduce the initial cost of inclined retorts as much as possible, so as to facilitate their adoption by small and average works. For the same make of gas, these arches will not cost more than horizontal regenerative settings; and they are adapted to works not requiring more than four or six retorts per bed. The benefits and economies resulting from the inclined-retort system may thus be rendered even more extensive and general than at present.

The author has not attempted in this paper to deal in any detail with the many interesting points in connection with inclined retorts. He has simply tried to follow the lines suggested in the programme of questions proposed, and has merely wished to place at the disposal of members of the International Gas Congress a few notes from his own experience of the subject.

TECHNICAL RECORD.

MEETINGS OF THE FRENCH AND ITALIAN GAS SOCIETIES.

The Twenty-seventh Annual Meeting of the Société Technique de l'Industrie du Gaz en France was held in the Palais des Congrès of the Paris Exhibition last Saturday morning. There were present upwards of 100 members, with M. Th. Vautier in the presidential chair.

The proceedings were merely of a formal character, owing to the following of the meetings in connection with the International Gas Congress. Mr. T. O. Paterson, the President of the Incorporated Gas Institute, was elected (as is customary) an honorary member of the Société for the current year; and 26 full members and 4 associate members were also added to the roll—making the total membership 625. The names of members deceased during the past year were then given by the President, who added a few appreciatory remarks concerning the career of each. Among the most notable were two Past-Presidents of the Société—M. Samson Jordan, one of those who originally contributed very largely to the prosperity of the organization, and who was known not only for his generosity, but for his devotion to duty and the smallest affairs which came under his notice in connection with business and professional matters. He began his gas career at Marseilles, and became a Professor at the Central School of Arts and Manufactures. He is also well known for the part he took in the foundation of the "Journal des Usines à Gaz." The other Past-President deceased was M. Eugène Breittmayer, who was the French President of the Union des Gaz, and was also the respected Director of several important concerns. Other names were those of M. Henry Drory, who had for many years been attached to the Imperial Continental Gas Association, and was their Manager at Vienna, and M. Auguste Rebuffel, who had been connected from the beginning with the gas industry in Italy—having from 1844 to 1853 built works at Genoa, Parma, and Turin, and following, in 1854, with the works at San Pier d'Arena, where he remained Manager till 1863. He afterwards occupied a similar position at the Milan Gas-Works, from which he retired in 1896, when he was appointed Honorary Manager until his decease.

For the five places vacant on the Committee, eleven names were proposed; the result being that MM. Coze, Frère, Séguin, Marquisan, and Sigaud were chosen. The Treasurer's report showed an increasingly satisfactory state of affairs in the finances of the Société—the capital reaching 203,652 frs. (£8146).

Last year's papers were then reviewed; and those members of the Committee who had contributed were thanked for their efforts. The conclusions of M. Vautier's paper on "Incandescent Lighting by Denaturatized Alcohol" were given as showing that at present it was not economical to adopt this method of incandescence as compared with gas, and was only feasible where the price of a litre of alcohol was rather less than that of a cubic metre of gas. M. Brouardel's description of the method of carbonizing in the gas furnace of the Compagnie Française du Centre et du Midi was referred to; and attention was drawn to the successful mode adopted of scurfing retorts by air pressure, as is done regularly in that Company, thereby increasing the life of the retorts. Allusion was likewise made to M. Bouvier's paper on the mechanical transport of coal and coke; and the economy secured by the aërial-way system at Metz was given at 48c. per ton of coal, besides which the material was carried three times more quickly than formerly. These papers, being by members of the Committee, were, according to the rules of the Société, inadmissible for consideration in connection with prizes. The three papers adjudged worthy of the 250 frs. given by the Société Technique were by MM. Lecomte, des Gouttes, and Daudy. The first dealt with incandescent gas lighting, and was a very complete examination into the causes of the varying power of mantles; the second was a paper describing the new works at Geneva, and the elaborate arrangements employed for storing coal for use in inclined retorts and carrying coke; and the third was a theoretical explanation of the stoppages in ascension-pipes, and a description of some means of relieving these difficulties.

As may be remembered by "JOURNAL" readers, every year there are distributed prizes of 200 frs. each to the oldest and most faithful workmen in the gas-works of France. This year 36 workmen received prizes out of 53 applicants. The time of service varied from 20 to 38 years. Twelve foremen and others were also presented with medals of honour from the French Government. This concluded the formal meeting, which was adjourned until the international assembly yesterday.

It may be mentioned that M. Vautier continues to hold the presidential chair throughout the Congress, after which he vacates his position in favour of M. Alfred Lebon, of the Compagnie Centrale du Gaz.

The Annual Meeting of the Italian Gas Association was also held in Paris on Saturday; but, at the time of assembling, there were only fifteen members present. The proceedings, as in the above instance, were simply formal, and were presided over by M. Victor Krafft, of Naples, who had to report a reduction in the number of members by four deaths, while only two new members were admitted. A few prizes were also in this case presented to workmen in Italian gas-works, for length of service and good conduct. It was further resolved that next year's meeting should be held at Florence, and the following one at Palermo.

We learn from Messrs. J. & A. Churchill, of Great Marlborough Street, that the third volume of "Chemical Technology, or Chemistry in its Applications to Arts and Manufactures," edited by Mr. C. E. Groves, F.R.S., and Mr. W. Thorp, B.Sc., is practically ready for delivery. Our readers will find this volume of special value to them, as in it Mr. Charles Hunt deals exhaustively with "Gas Lighting" and the relative advantages of gas and electricity. The important subject of coal, of course, comes under consideration.

REGISTER OF PATENTS.

Incandescent Mantles.—Daubenspeck, G., of Stoke Newington, N. No. 9273; May 2, 1899.

This invention relates to the manufacture of incandescent mantles or hoods "without the use of any rare earths or metals, or of any salts of the same, in its composition."

The patentee claims to have found, "by lengthy experiments," that the ordinary refractory materials—salts, oxides, hydrates, or chlorides of calcium—which incandesce brilliantly under great heat, may be rendered sufficiently tough and durable to retain their form when applied as a deposit to filaments to make a light mantle, when treated by a solution having a free acid, so as to cause chemical conversion and reaction among the ingredients *in situ* upon the supporting filament when subjected to the heat of a powerful burner, "which application of heat also serves the purpose of burning and volatilizing the organic and carbonaceous matter of the filament, &c."

To carry the invention into effect, a strong solution of chloride of calcium or chloride of lime (the latter preferred, because it destroys organic matter in the filament) is prepared; and by dipping a purified filament, or a framework of filaments, therein, a coating of the calcium salt thereon is obtained in the usual way. The filament, or mantle of filaments, is then dried. A final solution is next prepared, composed of a mixture of a salt of aluminium (preferably nitrate of aluminium) and nitrate of magnesium; and the solution is superacidified by the addition of an acid, so that free acid remains present, of which nitric or hydrochloric acids are found to be the best.

The following proportions for this solution are said to give a good incandescence to the finished mantle, with great durability: Nitrate of aluminium, 74 parts; nitrate of magnesium, 23 parts; nitric or hydrochloric acid, 3 parts. By varying the proportions slightly, different relative degrees of incandescence and toughness or durability can be obtained. For instance, the composition above stated gives a bright white light. If a warmer and more yellow light is desired, the nitrate of aluminium may be added in further excess; or sulphuric acid may be used as the free acid. This renders the light blue, but more dull; but if sulphuric acid be added to the composition, the effect is a blueish, but bright, incandescence.

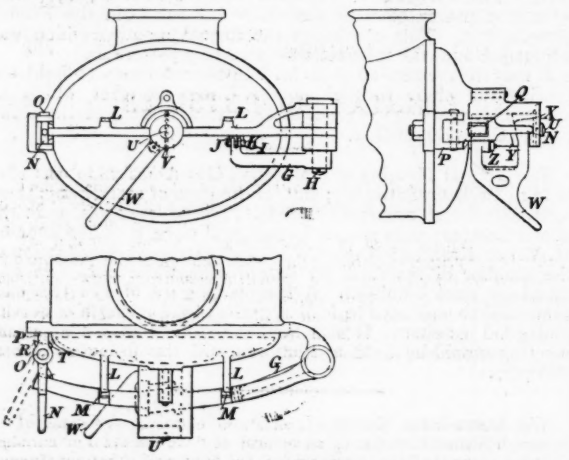
The mantle is dipped in the solution, dried, and again dipped and dried, if desirable. The mantle thus dried, there is applied to its head or upper part a solution of nitrate of aluminium and nitrate of magnesium alone—conveniently applied with a brush—"to further strengthen the head of the structure, even with some diminution of the incandescence of the material at that part."

The complete inter-reactions between the ingredients of the different solutions as described, "producing a rigidity and stiffening of the mineral deposit *in situ* upon the filament, is effected by burning the dried mantle in the flame of a powerful burner, which also serves to volatilize and burn away all organic and carbonaceous matter of the filaments and mantle—leaving a tough mineral ash of brilliant incandescent qualities under heat."

Fastening Retort-Lids.—Robinson, G. H., and Best, W. V., of Coventry. No. 15,468; July 28, 1899.

This invention relates to means for fastening the lids of retort mouthpieces and other self-sealing doors—in fact, all appliances in which the lids or doors are supported by a cross-bar and forced into contact with the door-frame by screws. It is an improvement upon patent No. 14,877 of 1896.

As applied to gas-retorts, a cross-bar is hinged at one end to a lug on one side of the retort mouthpiece; the portion of the cross-bar where the hinge-pin passes through it being forked to afford a good support—the lug being also forked. The holes in the cross-bar through which the hinge-pin passes are preferably slot holes, to allow the cross-bar and lid to move across the mouth of the retort when the lid is closed, so as to enable the edge of the lid to clear away any dirt or other matter from the face of the mouthpiece, and thus ensure a tight joint. G is an arm or lever fitted to the pin, and prevented from leaving it by a pin H. The lever acts as an extra support for the cross-bar and lid.



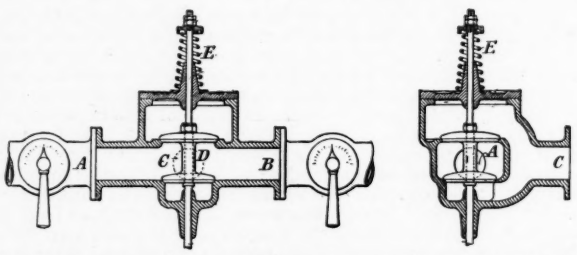
A slot or groove I is formed in the end of the arm, so as to engage with a projection J on the underside of the bar; a taper wedge K being fitted in the groove to keep the cross-bar horizontal and to compensate for wear and tear of the hinge. Attached to, or formed in one with, the lid are two wedges L (projecting outwards), the inclined surfaces of which rest on inclined surfaces M on the upper side of the cross-bar, to compel the lid, when closed, to move vertically over the face of the mouthpiece. N is a link pivotted at O to a lug or hinge P, which is bolted to the mouthpiece, and slotted at Q to receive the free end of the cross-bar. R, S, T, are lugs of which the two former are formed on the link N, while the latter is formed on the lug P, so that when the lid is opened the link N takes the position shown by dotted lines—the movement of the link to the left being limited by the lug R.

When the lid is closed, the end of the cross-bar strikes the lug S, and causes the link to move to the right, so as to engage with the end of the cross-bar, which is formed in such a manner as to prevent it from becoming disengaged from the link when the lid is closed, unless the link is purposely detached from the cross-bar. To make the lid close airtight against the retort mouthpiece, there is secured to the lid a pin or bolt U, which passes through the cross-bar, and which is secured therein by a nut or by a pin V and washer. Oscillating on the pin or bolt U is a forked lever W, the arms of which embrace the cross-bar and are formed with cam surfaces X, which engage with similar surfaces Y on the back and front of the cross-bar. These cam surfaces may be inclined planes, portions of quick-thread screws, or any other suitable shape to enable the lid to be forced tightly against the face of the retort mouth after the lid is closed by oscillating the lever W. On the inside of the lever W is a stud, on which rotates the roller Z, which bears on the underside of the boss of the cross-bar and throws the lid into its proper place when closed.

Admission and Governing Devices of Gas-Engines.—Ruud, E., of Victoria Street, S.W. No. 15,910; Aug. 3, 1899.

This invention has for its object to provide a device for regulating the supply of motive fluid to the cylinder, in accordance with the demand and the work taken from a gas-engine shaft.

In many engines at present on the market (the patentee remarks), the supply of motive fluid is regulated by a hit-or-miss governor, which operates to entirely cut off the supply of motive fluid if the governor balls rise to a certain extent. Consequently (with engines of this description), if the load is light, a large number of cycles will occur without any impulse being given to the piston, which is "very detrimental to the working of the engine, and renders the speed very variable." According to the present invention, the regulating of the admission of gas or air to the cylinder is provided for by the governor, which is combined with a valve inserted in the supply pipe; the proportion of air and gas being regulated, before the mixture passes the valve, by suitable regulating taps. By this means, once in every cycle there is a charge either greater or less, according to circumstances, of gas and air admitted to the cylinder. Furthermore, the percentage position of the mixture of gas and air will be approximately constant, although the quantity of the mixture varies with the power expended.



A is the gas-supply pipe, and B the air-supply pipe. C is the pipe through which the mixed air and gas passes to the cylinder. The pipes are provided with regulating cocks, by means of which the portions of gas and air in the mixture may be regulated. D is a double-balanced valve, the stem of which is guided in suitable orifices in the valve casing. The spring E, which can be adjusted by means of nuts, tends to keep the valve closed. The governor (of any suitable design) has its arms connected to the valve rod in such a manner that when the speed is reduced, the rod is operated to open the valve D, and thereby admit a larger volume of the motive fluid to the cylinder. When, however, the speed rises, the governor operates the valve so as to restrict the passage, and a less volume of the fluid is admitted.

Explosion Motors with Variable Admission and Expansion.—Marmonier, M. F., of Lyons, France. No. 16,218; Aug. 9, 1899.

This invention relates to an explosion motor having the following features.

1. A second piston is arranged in each cylinder, fastened on a slide by a movable joint, which can transmit during the first and second phases of the motor an alternate movement of more or less amplitude—thus communicating to the second piston an alternate movement of equally more or less amplitude in the same or opposite direction to that of the first piston. This augments or diminishes the quantity of explosive sucked in, and its degree of expansion after explosion, or, inversely, "in giving previously to the mixture a sensibly constant degree of compression." The joint receives its to-and-fro movement during the first and second stroke of the motor by the intermedium of a lever carrying a roller or sliding-block lodged in the groove of a part keyed on a shaft turning with half the speed of the shaft of the motor. The groove is so arranged that it is concentric to the shaft whereon the part is mounted. It is hollowed out in half circumference; and the slide-block or roller is lodged in this part of the groove in half circumference during the two last phases of the motor. The other part of the groove corresponds to two other phases of the motor, and carries an inflection point towards the axle, of half-speed rotation, or in a direction opposite to the axle. The slide can also receive a to-and-fro movement, during the two first phases of the motor, by means of a lever articulated on the crank-pin of a disc mounted loosely on the motor-shaft. The disc has a recessed throat and two inclined notches; so that two buffers which can slide in its throat and engage in the notches can, under the action of tensioned springs, press the disc in order to make it partake (one turn in two) in the rotating movement of the motor.

2. The governor of the motor is arranged so that when the sleeve which it carries is raised or lowered by it, it turns—in one direction or

the other—a cone integral with a conical pinion gearing with another pinion mounted on the rod, by means of which a screw is turned which displaces the screw or nut wherewith the block of the slide is connected, and consequently allows the admission of the explosive and the expansion of the exploded gas, to be automatically regulated.

3. A socket is arranged on the aspiration valve-spindle, in order to compress the spring of the valve when, during the third phase of the motor, the projection of the tappet which governs the outlet-valve bears on a lever whose displacement affects that of the socket. Thus, the explosive does not enter the cylinder at the end of the third phase of the motor.

4. An endless screw arranged on the slide-rod gears with a toothed sector whose angular displacement produces, by means of a lever, the angular displacement of the ignition cam; so that the advance to the ignition is automatically brought about in proportion to the quantity of aspirated air, which is modified by the rotation in one direction or the other of the slide-rod.

Prepayment or Coin-in-the-Slot Machines.—Grice, J., of Sutton Coldfield. No. 16,940; Aug. 21, 1899.

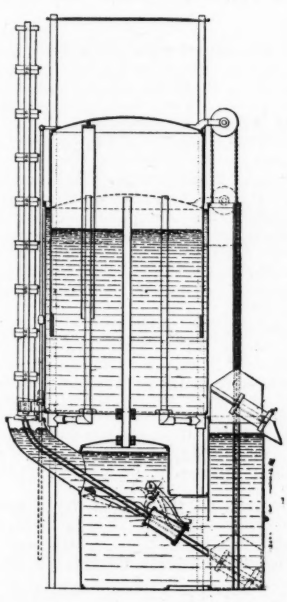
This invention of "improvements in machines for the automatic delivery of various articles," has for its object to prevent the freeing of the delivery or operating mechanism and the blocking of the same by iron discs or blanks. For this purpose, the patentee proposes to employ a magnet in combination with the machine in such a manner that, on the insertion of a disc or blank in the admission aperture, it will be attracted and deflected by the magnet, or will itself attract and deflect the magnet, and thus be arrested before passing on to the balanced lever or other part of the coin-freed mechanism.

Gas Cooking-Stoves.—Prior, J. D., and Yates, H. J., of Birmingham. No. 18,285; Sept. 11, 1899.

The patentees claim, in gas cooking-stoves: 1. The employment of a high or low pressure boiler for water, heated by the hot air and waste products of combustion from the stove, which are compelled to circulate in direct contact with, under, or around the boiler, and be deprived of their heat by absorption gills or their equivalent. 2. The employment of a hot closet heated by pure atmospheric air, through the medium of the hot air and products of combustion from the oven being compelled to circulate under, over, or around an air-chamber, arranged in the top of the stove, and being open at one end to the atmosphere and having communication with the interior of the hot closet—the chamber being also provided with gills, or their equivalent, for increasing the heat absorption surface.

Generating Acetylene Gas.—Hervieu, G. A., of Nanterre, France. No. 2631; Feb. 9, 1900.

This acetylene generator is arranged so as to prevent any dangerous over-production, by means of mechanism for distributing the carbide operated by the movements of the bell of a gasholder. The generator is also characterized by a device which permits of the bye-products or residues resulting from the manufacture of the gas being automatically evacuated, and also by its general arrangement, which does away with the use of any cocks, valves, or other similar stoppers.



The apparatus (shown) comprises essentially a generating receptacle properly so-called, a water reservoir or tank together with a gasholder bell, an automatic distributor operated by the bell, a device for receiving the carbide and placed within the generating receptacle, a receptacle for first receiving, and then carrying off, the residues left by the spent carbide, and mechanism operated by the bell for extracting the residues.

These different parts, considered separately (says the patentee), "may vary in form and dimensions, but, taken as a whole, they operate in a well-defined manner"—their "essential characteristic being that they are absolutely self-acting or automatic, both in the matter of feeding the carbide and of evacuating the residues."

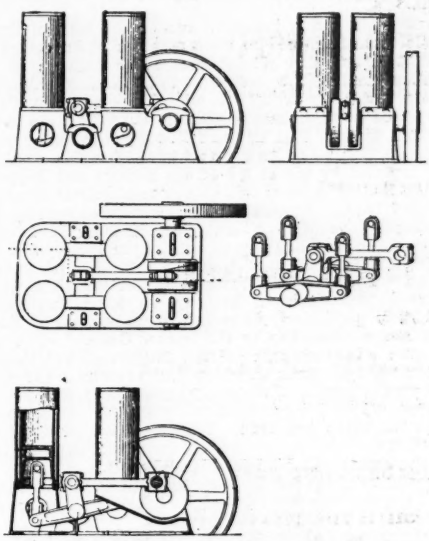
Gas-Engines.—Robinson, H., of Manchester. No. 19,164; Sept. 23, 1899.

This invention relates more particularly to the means of controlling the speed of gas-engines, as follows: The piston draws in to the cylinder the inflammable charge of gas and air or other supporter of combustion, through an automatic inlet valve, which may be held to its seat by a spring, during the outward stroke, and compresses the charge during the inward stroke. The combustion of the charge drives the piston outwards. The exhaust is now opened, and the products of combustion are expelled during the next inward stroke of the piston. Should, however, the speed of the engine rise above the normal, a trigger pivoted to a fixed point comes into action, and holds open the exhaust valve by coming into contact with a suitable nut or piece attached to the exhaust-valve spindle. A valve placed near the exhaust-valve on the atmospheric side of it, when the exhaust valve is held open, allows the piston to simply draw in and expel it through the exhaust-pipe.

A rod or equivalent working backwards and forwards, by suitable gear, at half the number of reciprocations of the piston, opens the exhaust valve at the proper times. Pivoted to the rod is a sliding-rod or projection, with a weight which hangs in such a manner that, when the speed of the engine exceeds the normal, the inertia of the weight causes the rod or projection to bear against a projection on the trigger, which moves it into the position necessary to come in contact with the nut or piece on the exhaust valve spindle, and hold it open.

Gas-Engines.—Morgan, C. H., of Worcester, Mass., U.S.A. No. 10,856; June 14, 1900.

The object of this invention is to couple four or more cylinders to a single crank-shaft, all supported upon a common bed, with the cylinders in proximity to each other, "whereby the engine is rendered more compact, its parts simplified, and an increased resistance afforded to the working strains."



Referring to the engraving, the base of the engine (upon which the crank-shaft and cylinders are mounted) has on it four upright cylinders mounted in two rows side by side. The cylinders—closed at their upper and open at their lower ends—each contain a reciprocating piston; and journalled in the base, and between the rows of cylinders, is a rocking-shaft provided with a pair of arms extending laterally beneath the open ends of the left-hand cylinders, and on the opposite side of the rocking shaft are a similar pair of arms extending laterally beneath the open ends of the right-hand cylinders. The free ends of the arms are connected with the pistons of the cylinders by rods; and extending upwards from the rocking-shaft (and preferably from its centre) is a short arm connected by a rod with a crank on a shaft journalled in the base, parallel with the rocking-shaft, and carrying a fly-wheel.

The engine is provided with the usual valve mechanism for the admission and exhaust of the explosive charge in the closed ends of the cylinders; but such valve mechanism is not represented, as it may be of any well-known type in common use in gas-engines.

The four cylinders represented are placed in two rows on opposite sides of the rocking-shaft and in proximity to each other. The cylinders in each row are also placed in proximity to each other, with a space between the lower cylinders for a connecting-rod and for access thereto.

APPLICATIONS FOR LETTERS PATENT.

14,845.—Yeadon, S. N., and Mason, W. D., "Revivifying gas lime (sulphate of calcium) and other analogous material." Aug. 20.
14,855.—Wilson, G., "Gas and explosive vapour engines." Aug. 20.
14,892.—Luyten, L., and Blumer, E., "Manufacture and purification of anthracene." Aug. 20.
14,952.—Sanson, L. H. M., "Carburetter." Aug. 21.
14,957.—Sugg, W. T., "Incandescent gas lighting." Aug. 21.
15,011.—Grove, D., "Sterilizing water for drinking purposes." Aug. 22.
15,030.—Bloxam, A. G., "Incandescence gas-mantles." A communication from the Phlox-Glühlicht-Gesellschaft mit Beschränkter Haftung. Aug. 22.
15,045.—Clay, W. R., and Ennis, C. F., "Incandescent gas-burners." Aug. 23.
15,108.—Dargue, W. H., "Production of acetylene gas." Aug. 24.
15,147.—Moisson, J. O., "Pressure regulators." Aug. 25.
15,164.—Winn, P., "Pendant gas and other lamps." Aug. 25.
15,187.—Brophy, M. M., "Cocks or valves." Aug. 25.

New Gasholder at St. Annes-on-Sea.—Messrs. Clayton, Son, and Co. have recently completed the construction of a new gasholder and tank at the St. Annes-on-Sea Gas Company's works. The Engineers were Messrs. Thomas Newbigging and Son; and at the inauguration of the new structure a few days since, the Chairman of the Company (Mr. George Webb) paid a most generous tribute to the work of both Engineers and Contractors, and to the services in connection with the matter of the Manager (Mr. W. H. Nutter) and the Sub-Manager (Mr. Hargreaves). On the same occasion, Mr. Newbigging gave a brief description of the new structure. He said that both tank and holder, with the guide-framing, were constructed of mild steel throughout; and the holder was telescopic in principle, in two lifts. The outer one was 90 feet in diameter; and each was 20 feet deep—the holding capacity being 240,000 cubic feet.

LEGAL INTELLIGENCE.

HOVE PETTY SESSIONS.

Monday, Aug. 27.

(*Before Mr.* R. A. BEVAN, *Chairman, and other Magistrates.*)

Gas-Works and the Factory Acts.

Judgment was given to-day in the case of the summonses taken out at the instance of the Inspector of Factories against the Brighton and Hove Gas Company for a breach of the Factory Acts. Seven summonses had been issued against the Company for employing young persons on a Sunday; and the defence raised was that gas-works do not come within the provision of the Factory and Workshop Act. Only one summons was dealt with as a test case; and the proceedings thereon were reported last week (p. 529).

The CHAIRMAN, in giving judgment, recited the facts of the case, as already set forth, and referred to the contention of the defendants that, being a Gas Company, they did not come under the Act. In support of this contention, the Bench were referred to the Notices of Accidents Act, 1894, to show that "gas work" was one of the employments specified therein for which notice in case of accident had to be given to the Board of Trade; and, further, that in the following year that portion of the schedule to the Notices of Accidents Act, 1894, which applied to gas-works was repealed by section 54 of the Factory and Workshop Act, 1895, and therefore that no notice of any accident had now to be given to the Board of Trade. He said the Bench were unanimously of opinion, on the hearing of the summons, that notwithstanding the defence raised, the defendants came within the provisions of the Factory and Workshop Act of 1878, and that the making of gas and other products was the making of an "article" within the meaning of section 93 of that Act. They reserved their decision, however, in order that their attention might more particularly be called to the sections of the different Acts of Parliament referred to by the learned Counsel who appeared for the defendants. He continued: Having fully considered these, and the arguments raised upon them, we see no reason to alter or vary the opinion we came to on the hearing of the summons—namely, that the defendant Company came within the provisions of section 93, sub-section 3, of the Factory and Workshop Act, 1878. We therefore hold that the case for the prosecution has been made out; and we convict the defendants upon the summons, and impose a fine of 10s. and costs.

A representative of the Solicitors for the defendants said the case had taken the Company by surprise; and he asked the Magistrates not to impose penalties in the other six summonses.

It was thereupon stated that the Magistrates did not think the Company had wilfully infringed the Act.

Mr. T. A. GOODMAN, Clerk to the Magistrates, said they would state a case for the Queen's Bench Division if the Company desired.

The offer was, however, declined; and a plea of "Guilty" in the six other summonses, which stood over awaiting the result of this case, was entered, and a nominal fine of 1s. and costs imposed in each case.

Action against the Barnstaple Gas Company for Specific Performance of an Agreement.

His Honour Judge Beresford gave judgment last week in an action brought in the Barnstaple County Court against the Barnstaple Gas Company, for the specific performance of an agreement to purchase certain land. The plaintiff, Mr. Thomas Pine, is a cab proprietor. On the 25th of April last, five Directors of the Company, together with the Secretary, made an inspection of his premises, and agreed to purchase, for £400, a yard of which he was the owner. Subsequently, it was agreed that £25 should be paid for an adjoining piece of land. Some difficulty arose respecting the claim of an adjoining owner to a right of way; but this, it was contended, was overcome, and the parties consented to the engrossing of the contract. Then a difficulty arose over a question of ancient lights; and, after inquiries as to the willingness of plaintiff to sell the whole property, the Company refused to proceed with the purchase. For the defence, it was urged that there was no binding contract, inasmuch as it was never signed. His Honour said there was strong evidence of an agreement to purchase in the correspondence, and especially in a letter written by Mr. C. E. R. Chanter, Chairman of the Board of Directors, and a member of the firm of Messrs. Ffinch and Chanter, whose head is the Solicitor to the Company. Counsel said that letter was written not by Mr. Chanter as a Director of the Company but for his firm; and, in any case, it did not satisfy the Act of Parliament, which required that a contract or agreement must be signed by two Directors. After taking time to consider the legal points raised, his Honour found for the plaintiff with costs.

Melbourne Metropolitan Gas Company.—The report of this Company for the half year ended June 30 states that the amount at the credit of the net revenue account is £57,947. After transferring to the reserve fund £15,000, the Directors recommend a dividend of 4s. per share; leaving £8659 to carry forward. In reference to the above transfer to the reserve fund, the Directors point out that this amount is towards providing for liabilities incurred in connection with improvements to the West Melbourne and Fitzroy works.

The Gas Question at Leamington.—A meeting of the Directors of the Leamington Gas Company has been held to further consider the communication recently received from the Leamington Corporation, in which that body asked the Company to allow them to withdraw their offer to purchase the works. The Directors had also under consideration a memorial, signed by over 200 ratepayers and gas consumers, in opposition to the purchase scheme. The question was discussed at great length; but it was decided that the result should not at the present stage be made public. The Directors also resolved, in consequence of the advance in the price of coal, to increase the charge for gas by 3d. per 1000 cubic feet from the Michaelmas quarter. The price in the borough before the increase was 2s. 5d. per 1000 cubic feet.

MISCELLANEOUS NEWS.

THE GAS AND WATER ORDERS OF THE PAST SESSION.

The report of the Board of Trade on their proceedings under the Gas and Water Works Facilities Act, 1870, during the past session has been issued. It states that in December, 1899, twenty-one applications for Provisional Orders were made to the Board—twelve relating to gas, and eight to water undertakings, and one to a gas and water undertaking combined. The amount of capital proposed to be authorized was £536,200 by shares and £135,800 by loan; and of the total amount (£672,000) £225,200 of share and £58,050 of loan capital was for gas, and £311,000 of share and £77,750 of loan capital for water purposes.

The applications for Gas Orders were in regard to Abergele, Dungannon, Heswall, Irthlingborough, Littlehampton, Lymington, Mablethorpe and Sutton, Manningtree and Mistley (Essex), Romford, St. Margaret-at-Cliffe, Elmsall and Kirkby, and Wath-upon-Dearne. Two of the applications—viz., those relating to Littlehampton and Romford—were in respect of undertakings already authorized by Provisional Orders, and sought the following powers: The Littlehampton Gas Company, Limited, authority to construct further works for the storage of gas, and to extend their limits of supply; and the Romford Gas and Coke Company, Limited, authority to raise additional capital. Eight applications—viz., those in regard to Abergele, Dungannon, Irthlingborough, Lymington, Mablethorpe and Sutton, Manningtree and Mistley, Elmsall and Kirkby, and Wath-upon-Dearne and the district—sought for authority to maintain and continue existing gas-works; and in the Irthlingborough and Elmsall and Kirkby applications power was also sought to construct additional works. Two applications—those for Heswall and St. Margaret-at-Cliffe—were for authority to construct and maintain new works; and in regard to Heswall also the promoters sought to be empowered to manufacture and supply acetylene gas.

In the case of the Heswall application, objections were lodged with the Board of Trade, and the promoters were also unable to obtain the consents of the Local and Road Authorities concerned. They accordingly informed the Department that they did not propose to proceed with the application. The St. Margaret-at-Cliffe application was withdrawn by the promoter, in consequence of object ons lodged by the Dover Gas Company; the greater part of the proposed area of supply being within the authorized limits of that Company. Objections were lodged against several of the other applications, and were fully considered by the Board of Trade; but Orders were granted in every instance, except in those before mentioned, subject to certain modifications and amendments. Local inquiries were held in two cases.

In the case of the Dungannon application, objections were lodged on behalf of the Dungannon Town Commissioners (subsequently the Dungannon Urban District Council). The promoters were also unable to obtain the consents of the Road Authorities in the proposed extended area of supply, and asked the Board of Trade to exercise the power conferred upon them by section 4 of the Gas and Water Works Facilities Act, 1870. The Board appointed Mr. Ingram B. Walker to hold a local inquiry, and upon his report decided to grant the Order, subject to modification and amendment, but refused their sanction to the proposed extension of the limits of supply.

In the case of the Wath-upon-Dearne and district application, the promoters were unable to obtain the consents of some of the Local and Road Authorities concerned, and asked the Board of Trade to dispense therewith. The Board appointed the above-named Commissioner to hold a local inquiry on the matter. When before the Commissioner, the promoters stated that they no longer proposed to include the parishes of Hickleton and Barnbrough in the limit of supply; and the consent of the Parish Councils and of the Doncaster Rural District Council (the Road Authority in respect of these parishes) therefore became unnecessary. They also agreed to the insertion of clauses to meet the objections of the Brampton Bierlow and Thurnscoe Parish Councils. The opposition of the Wath-upon Dearne and Bolton-upon-Dearne Urban District Councils was, however, maintained; and, after hearing the parties, Mr. Walker reported that, subject to certain conditions, the Order should be allowed to proceed. After considering his report, the Board decided to grant an Order in accordance with his suggestions.

In the following Orders a maximum price per 1000 cubic feet of gas was fixed; power being reserved to the Board of Trade, after three years, to alter the maximum or to substitute a sliding-scale: Abergele, 5s. 5d.; Dungannon, 5s. 10d.; Irthlingborough, 4s.; Lymington, 5s.; Mablethorpe and Sutton, 5s. 3d.; Manningtree and Mistley, 5s. 2d.; South Elmsall, South Kirkby, and North Elmsall, 4s. 6d.

The supply of gas in bulk beyond the limits of supply was authorized, subject to the usual limitations, in all the Orders except Romford. The usual minimum of 15-candle illuminating power of the gas to be supplied was prescribed where necessary.

Special provisions were inserted in the Irthlingborough Order with regard to the capitalization of certain premiums obtained from the issue of original capital; and in the South Elmsall, &c., Order, with regard to the price to be charged for gas to the Rural District Council of Hemsworth. The Lymington Order contained an agreed clause as to the purchase of the undertaking by the Lymington Corporation. The Wath-upon-Dearne Order gave power to the promoters to supply gas within a portion of the authorized area of the Elsecar and Wentworth Gas Company. Under an agreement entered into between the promoters and that Company, a clause was inserted in the Confirmation Bill to repeal their powers of supply within the district in question.

The applications for Water Orders were in respect of East Surrey, Elham Valley, Hayling, Maidenhead, Sevenoaks, the South-West Suburban district, Steyning and district, and Tonbridge. The Elham Valley application was for authority to construct new water-works. With this exception, all the applications were in respect of undertakings already authorized by Acts of Parliament or Provisional Orders, and sought for power to raise additional capital. The application of the East Surrey Water Company also included sanction to the purchase of lands by agreement; the South Hayling application, an extension of time for the completion of authorized works; and the Tonbridge application, the construction of works, the extension of the limits of supply, and the purchase of lands by agreement.

The promoters of the Elham Valley application failed to obtain the

consents of the Local and Road Authorities concerned, and did not proceed with their application. In the case of Tonbridge, the promoters failed to obtain the consents of all the Local and Road Authorities concerned, and asked the Board of Trade to dispense with such consents. The Board accordingly appointed Mr. Walker to hold a local inquiry in the matter. Upon his report they decided to dispense with the consent of the Tonbridge Urban District Council, and to grant an Order subject to certain modifications and amendments. The usual report was presented to Parliament. The remaining applications were granted, and Provisional Orders were made, with such amendments in detail as appeared desirable. The Sevenoaks Order contained an agreed clause as to the purchase of the undertaking by the Sevenoaks Urban District Council.

With regard to the only Gas and Water Order, the Hoylake and West Kirby Gas and Water Company, Limited, already authorized by Provisional Orders of the Board of Trade, applied for power to construct additional gas-works and water-works, and to raise further capital for gas and water purposes. The application was granted, and a Provisional Order made.

The Gas and Water Orders were submitted for confirmation by Parliament in five Bills—viz., the Gas Orders Confirmation (No. 1) Bill and the Gas Order Confirmation (No. 2) Bill, both introduced into the House of Lords on April 30; the Gas Provisional Order (No. 3) Bill, introduced into the House of Commons on May 3; the Water Orders Confirmation Bill, introduced into the House of Lords on April 30; and the Gas and Water Orders Confirmation Bill, introduced into that House on April 9. A petition was lodged against the Gas Provisional Order (No. 3) Bill by the Bolton-upon-Dearne Urban District Council in respect of the Wath-upon-Dearne and District Gas Order. The Water Orders Confirmation Bill was also petitioned against in the House of Lords by owners, &c., in Sunningdale and Windlesham, in respect of the South-West Suburban Water Order. The petition against the Wath-upon-Dearne Order was, however, withdrawn; and the Select Committee to whom the South-West Suburban Order was referred passed the Order without amendment. The second reading of the Gas Order Confirmation (No. 2) Bill in the House of Commons was opposed in respect of the Dungannon Gas Order; and, after debate, it was decided to postpone the second reading for a fortnight to allow of negotiations between the promoters and the Dungannon Urban District Council with a view to the sale of the undertaking to that Authority. The negotiations led to no result; and when the debate was resumed, the House of Commons decided to reject the Bill. No other opposition was offered to the remaining Orders; and the Bills passed through the various stages. The Royal Assent was given to the Gas and Water Orders Confirmation Bill on the 10th of July, and to the Gas Orders Confirmation (No. 1) Bill, the Gas Order Confirmation (No. 3) Bill, and the Water Orders Confirmation Bill on the 30th of that month.

The number of Orders applied for since the passing of the Gas and Water Works Facilities Act, 1870, is 520; and the Board of Trade have made 480 Orders, of which 470 have been confirmed by Parliament.

THE INSPECTION OF GAS LIQUOR AND OTHER WORKS UNDER THE ALKALI ACTS.

The District Inspectors' Reports—The Chief Inspector's Report for Scotland.

We continue to day our notice of the report of the Chief Inspector under the Alkali, &c., Works Regulation Acts (Mr. R. Forbes Carpenter) for the past year by giving some extracts from the reports of the District Inspectors, and from Mr. Carpenter's report to the Secretary for Scotland by which they are followed.

Dealing first with Ireland, Mr. E. G. Ballard reports that 24 sulphate of ammonia and 5 tar works were registered in his district last year. With one or two exceptions, the former are in good order and well conducted. Taking all the places where sulphate of ammonia is manufactured in Ireland, the number of works absorbing the sulphuretted hydrogen in oxide of iron is 22; the number burning it, 5; the number working on the continuous system of distillation, 14; and the number working on the intermittent system, 13. The proportion of sulphuretted hydrogen treated by various methods (in terms of sulphate made and per cent. of total make) is given as follows: Oxide purification, 92·8; retained by lime, 4; by combustion, 3·2. Products equivalent to 2992 tons of sulphate were made during the year. At the works where tar is distilled, proper arrangements are provided for dealing with the noxious vapours evolved in the operations; and no complaints have arisen.

In the district embracing the North of England, Mr. J. W. Young reports that 41 sulphate of ammonia and 6 tar works were registered last year. The total production of sulphate of ammonia last year from 48 works was 11,563 tons—an increase of 9 per cent. over 1898. The greater portion of the gas liquor is distilled in continuous plants; 37 works, or 77·1 per cent. of the whole number, using a continuous system for 96·1 per cent. of the liquor, the remaining 11 works, or 22·9 per cent., distilling 3·9 per cent. on the intermittent principle. Oxide of iron purifiers continue to be the general means for the destruction of the foul gases evolved from the saturators of sulphate of ammonia plants; the proportion of works being 82 per cent. of the total number, and 59·3 per cent. in terms of the entire bulk of sulphate made. There was less cause for complaint with the conditions of sulphate of ammonia works last year than in 1898, although in some cases the purifiers were found overworked and passing foul gas. Insufficiency of preliminary cooling and condensation of the foul gas from the saturators still remains a feature of several works. It was sought to obviate the inconvenience of back-pressure in the saturators at one works by cutting a hole in the top of the saturator, and allowing the foul gas and steam free egress into the saturator-house. But the unsavoury danger and illegality of this action, when discovered, proved less obvious to the manager than its seeming expediency. At another works, long-deferred alterations to the plant resulted in the saturator being left without "curtain" or "apron," so that the foul gas and steam followed the easy path thus left open into the saturator-house, in preference to the narrow way to the purifier. Elaborate inducements were tried by the manager and failed. The simple plan of confining the gases at the saturator by a bell did not suggest itself to him spontaneously. The erection of additional coke-ovens with plants for the recovery of residuals continues in this district. One works with Semet-Solvay ovens has lately begun to manufacture, and others with ovens of the same design will soon be in operation. Five plants for the working of the Claus sulphur-recovery process as applied to the foul gases arising from sulphate of ammonia manufacture were in operation during last year. Care was taken in the working of all of them; and satisfactory results were attained. An additional works for the distillation of tar was registered and brought into operation last year. The acidity of all the chimneys under inspection last year was greater than in 1898, mainly due to the use of inferior coal on account of the high price of that ordinarily employed.

In addition to Ireland, Mr. Ballard has under his supervision Cheshire, North Wales, and part of Lancashire, in which there are 23 sulphate of ammonia and 10 tar works. One new works of the former class, on the continuous system of distillation, was added to the list during the year. The older works remained the same, with one exception. There are, therefore, in the districts—18 works on the continuous system of distillation, 5 on the intermittent system, 19 absorb the sulphuretted hydrogen in oxide of iron, 3 burn it under boiler fires or in retort-flues, and 1 converts it into sulphur in a Claus kiln. The proportion of sulphuretted hydrogen treated by various methods (in terms of sulphate made and per cent. of total make) is as follows: Claus process, 3·8; oxide purification, 26·6; by combustion, 23·6; precipitated by metallic salts, 46. Mr. Ballard has no change to report with regard to tar-works. They are well conducted, and every care is taken to prevent the escape of noxious vapours into the atmosphere.

Reporting on the district comprising Widnes and Runcorn, Dr. J. Affleck states that all the sulphate and muriate of ammonia works are provided with excellent plant, which is well maintained; and therefore no perceptible nuisance is caused. The joint production of ammonia salts in the five works during 1899 was equivalent to 1336 tons of sulphate. The proportion of sulphuretted hydrogen treated by various methods of disposal (in terms of total liquor distilled) is as follows: Oxide purifiers, 22·6 per cent.; vitriol chambers, 28·4 per cent.; combustion, 49 per cent.

In North and East Lancashire and part of Yorkshire, the district over which Mr. H. Porter presides, there are now 14 liquor and 41 sulphate and muriate of ammonia works. The total quantity of liquor distilled equivalent to sulphate of ammonia was 19,102 tons; the proportion of liquor ammonia produced being only 0·53 per cent. of the total. The methods of dealing with the foul gases evolved in the manufacture of sulphate or muriate of ammonia were: Passed to vitriol chambers, 28·77 per cent.; absorbed by lime or oxide of iron, 55·22 per cent.; treated by the Claus process, 13·03 per cent.; by other processes, 2·98 per cent. There was one addition to the sulphate works during the year, where large plant was erected for manufacturing sulphate of ammonia from the ammonia produced by coke-ovens. At one works Claus plant was erected for dealing with the waste gases from the sulphate plant in place of the oxide purifiers. Mr. Porter says the plant is a fine example of this kind of apparatus, and is in every way well designed and constructed. By adopting this system, only two men are now required—one for day and the other for night duty; whereas in the past two extra men were needed for the best part of their time refilling the purifiers and turning over the oxide. At another works, where the continuous distillation process is now carried on, no lime or alkali is used for liberating the fixed ammonia, and the "devil" water from the condensers is constantly pumped back into the still. These changes were made on account of complaints of nuisance outside that part of the works; but they were proved not to be due to the sulphate plant. The manager is of opinion that the fixed ammonia lost is compensated for by the saving in labour in using and carting to and from the works the lime and subsequent lime sludge; and, further, the still never gets blocked up from deposit, or requires cleaning. The "devil" water from the condenser is continuously pumped back into the still, and the hot spent liquor from that vessel diluted with cold water to cool it. Mr. Porter calls attention to an excellent method for producing sulphate of ammonia which has been gradually developed by Mr. H. Green, Engineer and Manager of the Preston Gas Company, who gave him permission to publish the following description of it: The process is continuous. The waste gases heat the incoming liquor by passing through a tubular heater, and the hot liquor then passes to a divided flanged pipe, in which is a steam-pipe connected with the steam-boiler at both ends—one end returning the condensed water to the boiler. These pipes are of considerable length, with a slight rise from the horizontal from the outlet; and at two points in the length of the divided flanged pipe, the ammonia gas is drawn off to the saturator. The liquor with the fixed or combined ammonia is conducted to a small liming vessel of simple construction, provided with arms or agitators to prevent the lime from depositing. The saturators are copper vessels, into which mother liquor is pumped and acid run in continuously. After some hours' working, the saturator becomes heavily charged with salt, which is discharged from the bottom into a tip-box standing over a well into which the mother liquor drains. Sometimes two saturators are employed; but if only one, the process is not stopped, as fresh mother liquor is immediately run in from a store-tank over head. Another very excellent feature of this process is the arrangement for supplying a continuous and steady feed of ammonia liquor, lime liquor, and acid to the apparatus by means of floating telescope syphons, three in number, where the liquor, lime, or acid can be measured in a few moments, and the quantity adjusted to a nicety. The most striking feature of the process is the beautiful white crystalline salt produced, which can be bagged up very shortly after it is discharged, and is quite dry. Mr. Porter states that, with the 29 tar works in his district, there were no accidents of a serious character.

In the East Midland district, there are 8 gas liquor, 29 sulphate and muriate of ammonia, and 15 tar works. Mr. E. Morley Fletcher, the Sub-Inspector for this district, reports that there was an addition of two sulphate works during the year; while one sulphate works and another for the manufacture of liquor ceased to register. Of the two new works, one derives its liquor from coke-ovens and the other is a small gas-works. Both absorb the saturator gases in oxide of iron. The total quantity of ammoniacal products manufactured during the year amounted to 13,373 tons, calculated as sulphate of ammonia. No further progress was made with the revivification of the oxide of iron *in situ* other than that obtained by drawing air downwards through the oxide by chimney or artificial draught when the purifier is not in use. This method was introduced

at one other works in the district; making altogether four where it is in use. The total quantity of liquor distilled, equivalent to sulphate, was 17,073 tons, as compared with 16,769 tons in 1898; the proportion of sulphate and muriate of ammonia made by the continuous process being 94·2 against 89·5 per cent. The H_2S is disposed of as follows: Passed to vitriol chambers, 30·01 per cent.; treated by the Claus process, 37·56 per cent.; by oxide purification, 31·58 per cent.; and by combustion, 0·85 per cent. The number of tar-works was increased by one last year, and there are now 15 in the district. The new works are only small ones, with two stills; and, with the exception of this addition, there was practically no change. The foul gases from the still-worm ends were effectively dealt with; and, consequent on the low price of anthracene, distillation was in many cases not carried so far, and a less amount of sulphuretted hydrogen was doubtless evolved.

Mr. E. Jackson generally has something interesting to say about the South Midland district, in which there are 7 gas liquor, 78 sulphate of ammonia, and 22 tar works. Five sulphate of ammonia plants were erected in the district last year—three at works not hitherto registered. One was at a gas-works—a continuous still with annular condenser and oxide of iron purifier attached for dealing with the foul gases. At another new works, the sulphate plant is connected with a large set of coke-ovens. A continuous still has been erected, with iron pipe condensers, water cooled, and two oxide of iron purifiers, with change-valve for alternate revivification of the oxide *in situ*. A steam injector is also attached to further assist in drawing away any offensive gases from the men, and to induce a current of fresh air on to them while emptying the purifier. The "devil" liquor is run into the crude liquor well, and so returns to the ammonia still. The third new plant consists of a continuous still, water tubular condensers, and two oxide of iron purifiers supplied with water-valves. These purifiers are worked alternately, and air is forced through the oxide by a small pump to revivify *in situ*. The "devil" liquor is returned to the still, but does not run in with the crude ammoniacal liquor. The supply of the latter is stopped, and the former, which accumulates in the 24 hours, is steamed in the still, separately to drive off the sulphuretted hydrogen. Gas liquor is concentrated at seven works in the district; but in four of them sulphate of ammonia is also manufactured. The methods of dealing with the foul gases escaping from the saturators are the same as described in previous reports. The treatment of the "devil" liquor is much the same also. Mr. Jackson is pleased to be able to report that with two exceptions, either water-seals or hydraulic valves have been fixed at all works where more than one oxide of iron purifier is employed, or a written undertaking has been given that no purifier will be emptied while the ammonia still is in operation. A considerable number of important improvements were carried out last year at various works; and particulars of the most notable of them are given. The total quantity of liquor distilled last year, expressed as sulphate, was 25,413 tons; 97 per cent. of it being treated by the continuous process. The following are the proportions of the gas liquor distilled, where the sulphuretted hydrogen is treated by different methods: Passed to the hydraulic main, 1·5 per cent; treated by the Claus process, 12·7 per cent.; by oxide of iron or lime purification, 38·2 per cent.; by other methods, 45·6 per cent.; no sulphuretted hydrogen generated, 2 per cent. Mr. Jackson states that chemical manufacturers are finding increasing difficulty in satisfactorily disposing of the effluents from their manufacturing operations, and rendering them sufficiently innocuous to satisfy the different authorities responsible for the conservancy of watercourses into which spent liquors from their works have hitherto found an outlet. The spent limed liquor from ammonia works has presented considerable difficulty in this way; and any method that would enable the liquors to be easily and satisfactorily clarified would, he says, in many cases be very welcome. In two works in the district the whole of the spent liquor, after settling, is evaporated, and, with the present price of fuel, at enhanced cost to the manufacturers. With regard to the tar-works, Mr. Jackson has not much change to report as to the methods of dealing with the offensive gases escaping condensation in the worm. These are either burnt to render them innocuous, or, in some works, after further condensation, are scrubbed either with oil or water in coke-packed columns, and finally passed through oxide of iron or lime.

In the district embracing the South-West of England and South Wales, Dr. Alfred C. Fryer had last year 211 separate processes under inspection. Three new works for the manufacture of sulphate of ammonia and one for the distillation of tar were registered. The total quantity of ammoniacal compounds produced amounted to 8521 tons, calculated as sulphate of ammonia. The proportion of liquor distilled by the continuous process was 72·8 per cent. The sulphuretted hydrogen was treated by the various methods of disposal as follows, in terms of the sulphate of ammonia made: By the Claus process, 11·4 per cent.; by oxide of iron purification, 82·1 per cent.; by combustion, 6·5 per cent. The distillation of tar is carried on at 11 works in the district, and during the year one was added to the register. The waste gases from the worm ends and receivers are draughted by steam suction to the fire, and the vapours from the pitch-cooler are condensed and caught in a seal tank. Lennard's continuous tar-still is in operation at one works in this district; and Dr. Fryer points out that one of the advantages connected with it is the reduction of risk from fire and explosion on account of the small quantities of tar treated at one time. Comparatively little space is required for the erection of plant dealing with so large a quantity of tar. The heat, too, is utilized, and that given up by the condensers is employed for the distillation of light oils. The great freedom from the production of nuisance is, he adds, a praiseworthy feature of this still.

There were no fewer than 196 works registered for inspection in the eastern and south-eastern counties last year; 68 being works for the production of sulphate of ammonia, and 9 for the distillation of tar. The separate manufacturing processes under the supervision of Mr. F. Napier Sutton, who controls the district, numbered 262—a decrease of 4 as compared with 1898. Plant now exists at 75 works for the manufacture of sulphate of ammonia; but at two small works it remained idle throughout the year. The total quantity of ammoniacal compounds manufactured last year amounted to 44,063 tons, calculated as sulphate of ammonia. This is a decrease of 362 tons on the quantity made in the previous year. Upwards of 98 per cent. of the ammoniacal liquor treated is now distilled by the continuous method; and the old intermittent system is only in use at some 13 of the very smallest works. There is an increasing tendency for the manufacture of sulphate to be undertaken by gas companies, and the quantity of liquor available for private distillers consequently diminishes. In 1898, the proportion manufactured by private firms in the district was 21·3 per cent.; whereas in the past year it fell to 16·4 per cent. Mr. Sutton says this was but natural, when the difficulty and expense of carriage of the weak raw liquor is considered. The sulphuretted hydrogen was treated by the following methods of disposal, in terms of sulphate made and per cent. of total make: Taken to vitriol chambers, 66·7 per cent.; treated by the Claus process, 11·5 per cent.; by oxide purification, 6·2 per cent.; by neutralization of sulphur dioxide (combustion), 5·3 per cent.; by hydraulic main and other means, 3·4 per cent.; by combustion *per se*, 6·9 per cent. The proportion of sulphuretted hydrogen treated by the different methods of disposal underwent some modifications in the past year; and the quantity treated by approved methods shows an increase. This is particularly apparent in that now dealt with by the neutralization method, while the number of works dealing with sulphuretted hydrogen by combustion *per se* and the proportion of gas treated show material decrease. By far the largest proportion of sulphuretted hydrogen is utilized direct for the manufacture of sulphuric acid; this amounting to 66·7 per cent. of the whole. Mr. Sutton says the method is undoubtedly the best practicable; but it is only available at a few works at which acid plant either exists or is contiguous thereto. The use of sulphuretted hydrogen as a source of sulphur for acid making has made much progress in recent years, and the difficulties experienced in the utilization of this material have been overcome. Treatment of the foul saturator gases by oxide purification is in use at 43 works, and the proportion of gases so treated amounts to 6·2 per cent. This method is most suitable for small works where the daily and annual make of sulphate does not exceed 30 cwt. and 200 tons respectively. Revivification of the oxide *in situ*, by chimney draught or other means, has been found very effective in prolonging the active life of purifiers which showed signs of exhaustion before such help was adopted. Revivification by downward draught to a chimney has the advantages of easy application and very complete control; but Mr. Sutton points out that there are disadvantages connected with the system. There is the tendency for the oxide to harden and give back-pressure—frequently necessitating the discharge of the material before it is anything like saturated; and there is the destruction by charring or corrosion of the wood or iron grids supporting the oxide, by the heat engendered by re-oxidation being drawn downwards. The latter feature has in one instance given much trouble, and at present the grids have been discarded for coarse brick rubble which has been placed in the purifier bottom as a support for the oxide. Absorption of the foul saturator gases by oxide has, in general, been carefully and conscientiously carried out; and the purifiers have rarely been found otherwise than in an active and inoffensive condition. Neutralization of the sulphurous acid produced by the combustion of sulphuretted hydrogen in a special furnace has been in use at three large works in the district, and has been accomplished satisfactorily on the whole. The proportion of sulphuretted hydrogen now treated by this method has reached 5·3 per cent. The results of tests made at three works where the neutralizing process has been in use are given by Mr. Sutton. They show that an average of more than 95 per cent. of the sulphurous acid was absorbed. At two of the works, the sulphuretted hydrogen given off on the distillation of the ammoniacal liquor is passed to the hydraulic main or to the crude-gas main, to be dealt with by the ordinary purification plant; while at a third it is retained in combination by lime and metallic salts. The proportion of gas treated by these means at the three works in question is 3·4 per cent. The balance is disposed of by combustion *per se* in the retort and boiler flues; and the resulting sulphurous acid escapes into the air with the chimney gases. It is satisfactory to find that there was no complaint of nuisance or damage arising from sulphate of ammonia works during the past year. Gas tar is distilled at 17 works in this district, and the stills employed number about 120. With the exception of one establishment where a very small still is occasionally used, all the works are provided with appliances for conveying away the permanent gases from the worm ends and receivers, and for treating them by absorption or combustion. No nuisance arose from those works.

The report of the Chief Inspector to the Secretary for Scotland includes the details of the work done, together with some interesting statistics, furnished by Mr. W. S. Curphey, the District Inspector. They show that the number of works in Scotland registered under the Alkali, &c., Acts for the past year was 127—an increase of one over the preceding year. Of these, 10 were registered as "alkali" works, and in the remainder one or more of the various manufacturing processes enumerated in the schedules appended to the Acts were in operation. The various processes under inspection numbered 207; being again an increase of one over 1898. Of the total, 2 were connected with the treatment of gas liquor, 63 with the manufacture of sulphate and muriate of ammonia, and 46 with the distillation of tar. The quantity of salts of ammonia made (expressed as sulphate) last year was 72,663 tons, as compared with 69,474 tons in 1898. The sources were as follows: Gas liquor works, 14,742 tons; iron-works, 17,563 tons; shale-works, 38,780 tons; and coke and carbonizing works, 1578 tons. The production of pitch was 129,327 tons, against 120,819 tons in 1898. In the course of inspection, 473 visits were paid, and 335 examinations were made of the gases passing into the air from the various works. The general average escape of acid gases from all the sulphuric acid works was equivalent to 1·66 grains of sulphuric anhydride per cubic foot of total escaping gases. The average escapes of these gases are very slightly less than the corresponding figures for 1898. Mr. Curphey says the condensation was efficient, and the actual amount permitted to escape into the air was less than half that allowed by the Acts. In works using gas liquor, the continuous system of distillation was in general use in the larger establishments. In some of the smaller ones, however, the old style of intermittent distillation still exists. The present high price of fuel, if prolonged, will tend to increase the adoption of the continuous system, by which at present 88·6 per cent. of Scottish gas liquor is treated. In the iron and shale works, all the ammoniacal liquor is distilled by the continuous method. In the carbonizing or coke works, the intermittent system is still in use in certain small establishments. Of the salts of ammonia produced in Scotland from all varieties of ammoniacal liquor, 97·5 per cent. was obtained by the aid of the continuous form of still. In 30 works, gas liquor was distilled; 18 of them working on the continuous, and 12 on the intermittent system. Three modes of disposing of the noxious gases were in use: (1) Oxide of iron

purifiers were used in 22 works, and dealt with the waste gases coming from 73·2 per cent. of the salts of ammonia produced from gas liquor. (2) Combustion was resorted to in five cases, and disposed of 22·8 per cent. (3) Decomposition of the sulphides present in the liquor by means of copperas was utilized in three works, and disposed of the volatile sulphurous impurities incidental to the production of 4 per cent. of the salts. The number of works in which tar was distilled last year was 46—an increase of one over 1898. No change as to the mode of dealing with the waste gases from tar distillation has to be recorded.

ASCOT DISTRICT GAS COMPANY.

The Half-Yearly Meeting of this Company was held last Wednesday, at the Offices, No. 46, Cannon Street, E.C.—Mr. Robert Berridge, Assoc.M.Inst.C.E., in the chair.

The Secretary (Mr. W. A. Schultz, F.C.A.) read the notice convening the meeting; and the report and accounts were taken as read.

The Chairman said the report and accounts provided pleasant reading; showing, as they did, a profit of £1161. After providing for every charge against the working, there remained a balance of £1882 at the credit of profit and loss account, out of which the Directors recommended a dividend at the rate of 4½ per cent. per annum on the share capital—leaving a balance of £893 to be carried forward. This he thought the shareholders would consider very satisfactory; for on June 30 last year, they had only £728 to carry forward. It was certainly a decided improvement. They were making more gas now than they did last year. The gas produced in the June half of 1899 was 11,113,000 cubic feet, as against 11,763,800 cubic feet in the past six months. The gas sold in the same periods was respectively 10,031,000 cubic feet and 10,454,000 cubic feet; while the gas sold per ton of coal carbonized was 9296 cubic feet, and 9300 cubic feet. This, while only a slight rise, was on the right side. The amount received from coke per ton of coal carbonized was 6s. 3d. in the first half of last year, while this year, he was glad to say, it was 8s. 2d. This additional value was a little help to them in meeting the extra price of coal which they had now to pay. The amount received for coke per ton sold, less expenses, was in the June half of last year 14s. 11d., and in the past half year 18s. 8d. He was glad to say the ordinary consumers had increased from 385 to 400, and the prepayment consumers from 88 to 137. The number of stoves on hire had also risen from 107 to 151. He thought all gas companies were experiencing an increase in the number of consumers on account of the extra cost of coal. The number of public lamps had advanced from 81 to 98. Since the last meeting, the Directors had had a busy time in connection with the purchase of the Bagshot Gas-Works and other matters. Their attendances at Board meetings during the half year had been really considerable. Immediately after they got over the transfer of the Bagshot works, they proceeded to lay an 8-inch main from the end of the present main in the Bagshot Road to Bagshot; and the work was being steadily carried out—in fact, he believed it was now more than half done. For some years, the supply at Bracknell had been very short; and it had been troubling the Directors a great deal. Two years ago they duplicated the 6-inch main supplying that district. But this was not entirely satisfactory; and so they were extending their 12-inch trunk main up to the point from which they laid the two 6-inch mains, which, they hoped, would give a satisfactory supply to Bracknell. Part of the 8-inch main which was being replaced by the 12 inch one would be used in the Bagshot district. The Directors had also secured a small piece of land in Bracknell in case they required to build a holder there. Anyway, the ground would be very useful for other purposes. There was no question about this, that, with the Bracknell supply, with the increase in the number of consumers both at Ascot and Bracknell, and with the purchase of the Bagshot works, they would in time have to consider the question of erecting a larger holder either at the Ascot or Sunninghill works. The Directors had also made an arrangement with the South-Western Railway Company to lay a siding from their line into the works; for hitherto, ever since the works had been in existence, they had had to cart the coal and everything else nearly ¾ mile. Even on the present working, the siding would save the Company about £100 a year; and afterwards, as the business increased, it would effect a considerably greater saving. Of course, they did not know what would be the result of the current half-year's working; but they hoped they would do as well as last year. He was afraid, however, they would not, because they must look forward to the present rise in the cost of coal. Although they had not had to advance the price of gas so far—and they trusted they would not be compelled to do so—they could not, of course, yet see what they would have to do in future. The price they were paying for coal was 25 per cent. higher than before. This was a serious increase; but they would try the experiment of continuing the existing price of gas for the present, and see how they got on. He moved the adoption of the report and accounts.

Mr. Alfred Kitt seconded the motion.

Surprise was expressed by Mr. F. B. Floate that the price of gas had not been increased. But it was pointed out to him that the present charge was high—4s. 6d. per 1000 cubic feet—and that to raise it might stop the progress the Company were now making. Mr. J. T. Pratt and Mr. Charles Gandon expressed their approval of the Directors' policy.

The motion was unanimously carried.

On the proposition of the Chairman, seconded by Mr. F. H. Pilley, a dividend at the rate of 4½ per cent. per annum was declared.

Dr. Strong then gave notice that, in consequence of the large increase in the Company's business, coupled with the purchase of the Bagshot works, he should, at the next meeting, move that the number of Directors be increased, and their remuneration be also taken into consideration. He was satisfied that the present Board carried out their duties exceedingly well; but, with only three members, he feared that, in case of illness, they might have a difficulty in forming a quorum.

Mr. H. Woodall moved a sincere vote of thanks to the Chairman and Directors for their services. He commented upon the large amount of work they had had to perform in the half year, and the insignificance of their remuneration.

Dr. Strong, in seconding the motion, suggested that it should be extended by the incorporation of an honorarium of 100 guineas to the Board and the Secretary.

This was supported by Mr. Gandon, and accepted by Mr. Woodall; but it was afterwards decided to omit the Secretary on the understanding that the question of an increased remuneration to him, in view of the extra work the business now entailed, should be taken into consideration by the Directors.

In its amended form, the proposition was unanimously carried.

The Chairman made suitable acknowledgment; and the proceedings terminated.

HARROW AND STANMORE GAS COMPANY.

The Half-Yearly Meeting of this Company was held on Saturday last, at the Albion Tavern, Aldersgate Street, E.C.—Dr. J. W. Lee Glaisher, F.R.S., presiding.

The Secretary and Engineer (Mr. J. L. Chapman) having read the notice convening the meeting,

The Chairman moved the adoption of the report and accounts submitted to the shareholders. He said he was glad to be able to congratulate the proprietors upon the very successful half-year's working of the Company. The figures he would lay before them would speak for themselves. The coal carbonized amounted to 3156 tons; and the oil used, to 17,473 gallons. The quantity of gas made was 37,974,000 cubic feet; being an increase of 4,844,000 cubic feet. The gas sold amounted to 35,267,000 cubic feet, or an increase of 4,609,000 cubic feet. The gas made per ton of coal carbonized was 10,294 cubic feet. As regarded the oil gas, the oil used amounted to 3·19 gallons per 1000 cubic feet. The unaccounted-for gas was 2,096,000 cubic feet. This was about 5½ per cent. of the make, or a little less than in the preceding year. The amount of gas sold in the three districts served by the Company was as follows: Harrow, 19,008,000 cubic feet, or an increase of 2,859,000 cubic feet; Sudbury and Harrow Weald, 4,356,000 cubic feet, or an increase of 421,000 feet; and Stanmore, 7,783,000 cubic feet, or an increase of 919,000 feet. The amount of gas supplied for public lighting was 4,120,000 cubic feet, or an increase of 410,000 feet. There was therefore a large increase in each of the districts; but this would be shown more clearly by the percentages. In the Harrow district, the increase over the corresponding period of last year was 15 per cent, in Sudbury and Harrow Weald nearly 18 per cent., and in Stanmore nearly 11 per cent. The largest of these percentages was in Sudbury and Harrow Weald; but there the gas consumed was under 4½ million cubic feet. The increase in the gas used for public lighting was 11 per cent. When presiding at the meeting of the Company a year ago, his father referred to the long period of comparative quiescence which they had experienced in Harrow, and spoke of progress having begun there. On that occasion he said that there had been sold in the Harrow district over 16 million cubic feet of gas, which was an increase of close upon 5 per cent. over the corresponding period of the previous year, and was the largest consumption that had ever taken place in Harrow. This result, however, had been excelled greatly by the figures which he (the Chairman) had just given. Instead of an increased consumption of about 760,000 cubic feet in the Harrow district, the amount on the present occasion was nearly 3,000,000 cubic feet; and the percentage of increase, instead of being 5, was 15. The coke and breeze produced was 2051 tons, the amount sold 1277 tons, and there was used 554 tons. The tar made amounted to 38,474 gallons, and there was sold 40,674 gallons. The quantity of sulphate of ammonia manufactured was 29 tons, or 19 cwt. per 100 tons of coal carbonized. He would now pass on to the financial part of the balance-sheet. The expenditure showed an increase in every item. In the manufacture of gas, coal and oil cost £576 more, wages £60 more, and repairs of works £319 more. The last item, however, included the renewal of a gasholder to receive the water gas. With regard to distribution, they had spent £149 more on repairs of mains, maintenance, &c., and £58 more on repairs and renewals of meters. Rates and taxes showed an increase of £47. The result was that the total expenditure amounted to £6775, or £1216 more. This seemed a very large increase in the expenditure; but he was glad to say that the increase in the receipts exceeded it, for to set against the extra outlay they had an additional income of £1581. The receipts from all sources amounted to £10,038. The main items which went to make up the increase of £1581 in the receipts were £939 more for gas sold, £33 more for rental of meters, stoves, and fittings, £264 more for coke, £119 more for tar, and £18 more for sulphate of ammonia. The increase in the receipts for residuals amounted to £402, which was a very considerable sum. They had written off £200 from the suspense account; and they were enabled to pay the same dividends as last year, and to carry forward a balance of some £400. He thought these figures spoke for themselves more eloquently than anything he could say. There had been an increase in every item all round; and it was very satisfactory that the increase was again so large in the Harrow district, where some years ago they scarcely looked to find their greatest development. This, he thought, finished what he had to say about the balance-sheet. There were, however, some other matters that should be mentioned. First, there was the increase in the price of coal. They had very reluctantly had to raise the price of gas by 3d. per 1000 cubic feet; but this did not nearly represent the additional amount they had had to pay for coal. The working of the Company had, however, been so satisfactory in the past half year, that they hoped to be able to get along with the small increase of 3d. per 1000 cubic feet. Under their Act, if they wished to raise the price of gas above 4s. 3d. per 1000 cubic feet in the Harrow district, they had to obtain the sanction of the Board of Trade; and for this purpose a public inquiry was held. The figures were placed before the Inspector, who sanctioned an increase of 3d. per 1000 cubic feet in the price in the district referred to, from the next quarter day to the June quarter of next year. He thought the facts clearly proved that the price of coal forced them to raise the price of gas; but they were able to get on with a comparatively slight increase.

Mr. James Randall seconded the motion, and it was carried unanimously.

The Chairman next proposed that dividends be paid for the half year ended the 30th of June last at the rates of 8 per cent. per annum on the original "A" capital, 7 per cent. per annum on the additional "B" capital, £5 12s. per cent. per annum on the additional "C" capital, and 6 per cent. per annum on the guaranteed shares, all less income-tax.

This was seconded by Mr. H. J. Rydon and agreed to.

The meeting having been made special,

The Chairman moved that the Directors be authorized to issue £20,000 of additional capital, and to borrow on mortgage or by the creation of debenture stock £5000 in respect of such additional capital, in pursuance of the Acts of Incorporation, in such manner and at such times as they might deem best. He said the balance-sheet showed that the capital account was already overdrawn by £6000. They had been erecting very considerable works; and they had now before them the plans for a new retort-house. The district, also, was growing; and this necessitated the laying of new mains, which was going on very fast now. All this required money, and they could not get along without increasing the capital. The Directors therefore asked for power to issue additional capital and to borrow a sum on mortgage or by the creation of debenture stock.

Mr. Lennard seconded the proposition, which was carried unanimously.

The Chairman, in proposing a vote of thanks to the Engineer and Secretary, said the prosperity of the Company during the last twelve months had been quite phenomenal. They had had to increase the works, buy an acre more land, and erect water-gas plant.

The motion having been seconded and carried,

Mr. Chapman returned thanks. He said the water-gas plant had been a very great help to the Company. They had their old coal contracts running until the end of April, and so had only bought coal at the higher price for the last two months of the half year. For a Company like theirs, 3d. per 1000 cubic feet was a very small rise in the price of gas. It was only the great increase in their business that enabled them to get along with less than 6d. rise. One very satisfactory point was that since the raising of the price in the outside districts there had been not the least falling off in the rate of increase of consumption; the increase was still running on at 15 per cent.

A vote of thanks to the Chairman terminated the proceedings.

WINDING UP OF THE SKIPTON GAS COMPANY.

The Final Stage.

The Final Meeting of the shareholders in the above-named Company was held in the Board-room at the gas-works last Wednesday—Mr. J. Watson presiding. The Chairman explained the business of the meeting, and said the price which the Urban District Council paid for the works and undertaking was £66,500. The purchase price recently paid by local authorities for gas-works under similar circumstances was equal to about 30 to 31½ years' purchase; whereas the price obtained for the Skipton works was equal to about 33⅓ years' purchase. He thought this was very good. The shareholders had had previously distributed to them a large proportion of the purchase-money, on the basis of £252 for every £100 worth of 9 per cent. stock, and £210 for every £100 worth of 7½ per cent. stock. The cost of the parliamentary and arbitration proceedings, winding up, &c., was £3000 (a portion of which was recoverable from the District Council); and there remained at the bank a balance of £1023, to which was to be added about £19, since received—making a sum of £1042 at the disposal of the shareholders. The Chairman added that there were certain persons to whom he thought the shareholders might grant an *honorarium* for their services—mentioning the Manager (Mr. J. H. Woodward), the Secretary (Mr. J. Haigh), both of whom had done a great deal of work, and Mr. Henry Cowman, who had been a collector for about twenty years. He also alluded to the services of the Directors, all of whom had, he said, paid very careful attention to the interests of the shareholders, and, as a result, had maintained the works in such a state of efficiency as to contribute towards the successful negotiations which had been made with the town. The Directors then left the room while the shareholders discussed the subject of the disposal of the balance. Various suggestions were made; and it was subsequently decided that the Chairman should have £100, the Vice-Chairman (Mr. F. W. Thornton) £30, and the other Directors and each of the three officers £10 each—making £200 in all; the remainder to be distributed among the shareholders. This will amount to about a half-year's dividend as usually paid. A vote of thanks to the Chairman, officers, and Solicitor (Mr. E. Wood) concluded the business, and also the existence of the Company.

WEST BROMWICH GAS DEPARTMENT.

The Dellwik-Fleischer Water-Gas System to be Introduced.

A Special Meeting of the West Bromwich Town Council was held on Monday last week, under the presidency of the Mayor (Alderman S. Pitt), for the purpose of considering certain recommendations from the Gas Committee for the extension of the works. Mr. Bushell submitted the report of the Gas Committee, some extracts from which were given in the "Journal" last week. The Deputy Town Clerk read the letter from the Local Government Board, referred to therein, containing their refusal to sanction the loan for the water-gas plant. They stated that a Departmental Committee were appointed in 1898 to inquire into and report upon the following matters: (1) The extent to which water gas and other gases containing a large proportion of carbonic oxide were manufactured, used for heating, lighting, and other purposes; (2) the danger attending such manufacture and use; and (3) the means by which such dangers might be removed or diminished, either by the discontinuance of the use of such gas or gases or otherwise, and what regulations for the prevention of danger should be established. As that Committee's report and recommendations were under consideration, the Board were not prepared at the present time to entertain this part of the application. Mr. Bushell, in moving the adoption of the report, urged that the Corporation could defray the cost of the water-gas plant out of the revenue account, which he felt would be to their financial interest. He pointed out that the Committee had given much thought to the question of extending the gas-making plant. The works had been established twenty years; and in this time the output of gas had rather more than doubled. The Committee had kept pace with the growing demands of the district by modernizing the plant from time to time; thus enabling them to get a much larger production of gas from practically the same area. In the winter, the capabilities of the works were severely taxed; and if a succession of dark and foggy nights were to occur, the entire plant would be altogether insufficient to cope with the demands, and they would have no margin or reserve in case of a breakdown or accident. Therefore it was imperative that some extension should be made; and the Committee considered that, as a water-gas plant would be sufficient for their requirements for some time to come, it would be better to spend about £4000 in laying down this system than in adopting a coal-gas plant, which would cost £16,000 or £17,000. The Committee recommended the introduction of the water-gas apparatus for many reasons. They intended to use it in conjunction with the ordinary plant, and proposed a maximum admixture of one-fourth in bulk with the coal gas. This would produce a gas which the experience of other works proved to be in every way satisfactory. Alderman Rollason seconded the motion. Mr. Lawley, in supporting it, mentioned that the Committee had seen water-gas plant in working order, and the rapidity with which the gas was generated was simply marvellous. He considered the Corporation would be taking a very wise step in introducing it. Mr. Browne objected to so important a matter being rushed, and proposed, as an amendment, that the recommendations be referred back to the Committee. He thought the time was very inopportune, with the present expensive electric light undertaking on hand, to launch out into a further scheme. Mr. Keys seconded the amendment. Mr. Newman thought, before going in for extensions of their gas-making plant, they should wait and see what effect the electricity supply undertaking would have upon the gas-works. Mr. Bushell said they expected that West Bromwich would be able to support both concerns. The Mayor said he thought they should take every precaution to protect the workmen engaged in the manufacture of water gas and also the burgesses from any deleterious effects of the gas. Eventually the recommendations were agreed to; only four members voting against them.

THE PUBLIC LIGHTING AT DEVONPORT.

A Special Meeting of the Devonport Town Council was held last Thursday, for the purpose of considering the report of a deputation who visited Liverpool to inquire into the question of street lighting, and particularly the preference given to incandescent gas lighting by a Corporation possessing their own electricity works. A summary of the Committee's report was published in the "Journal" for the 12th of June (p. 1561). It recommended the Council to light seven of the principal streets with electric arc lamps, and all the other thoroughfares with incandescent gas-burners in specially constructed lanterns. In order to carry out their recommendation efficiently, the Committee advised the Council to purchase the pillars and brackets from the Gas Company, and take over the lighting and maintenance of the lamps. The Committee's estimate of the cost of the improved lighting, including capital charges, was £3068, as compared with £2632 paid to the Gas Company in 1899.

Mr. Whitby moved that the report be adopted, and negotiations opened with the Company, with a view to giving effect to it. He said the object of the deputation to Liverpool was to ascertain how far it would be desirable for the Corporation to supply themselves with electricity for street lighting, or whether they should renew the contract with the Gas Company. The Liverpool Corporation owned electricity works, but most of the thoroughfares were lighted with gas on the incandescent system—the supply being furnished by the Gas Company. If the whole town were lighted on the incandescent system, the Committee's estimate was that it might be done for £2357 per annum, or £275 less than the present charge. He believed, however, that the saving was very much underestimated. As the mantles would probably be supplied at 6d. instead of 1s. each, there would be a difference of £111, and the sinking fund and interest, which were estimated at £390, would not, he believed, exceed £300. The Gas Company imposed an extra charge of 5s. per annum for incandescent burners; but the opinion of the deputation was that, instead of being increased, the price should be largely reduced.

Considerable discussion took place as to the streets included in the electric lighting area. One of the members suggested that wherever the tramways were laid the electric light should be provided. This meant, he said, that all the main thoroughfares would be so lighted. Other members pleaded for the inclusion of certain streets in the list.

Mr. Stanbury said the Gas Company had provided a light which did not satisfy the town at a cost which, it seemed, could be considerably reduced. He did not, however, see in the report any provision for a sinking fund. As to the suggestion that electric lighting should be provided everywhere, it was a fact that electricity could not compete in cost with incandescent gas lighting.

Dr. May remarked that members advocated the lighting of their own wards irrespective of the general good. He was glad to see incandescent gas lighting recommended, as electricity was twelve times more costly than gas. Speaking amid considerable interruption, he said he was not against the use of the electric light, if they could afford it; but an incandescent gas-light cost £1 8s. 3d., whereas an electric light cost £17 17s. 1d. Would the electric lamp give twelve times the amount of light to be obtained from the incandescent gas-burner?

Mr. Stanbury said Dr. May had taken as the basis of his remarks 2s. 5½d. per 1000 cubic feet as the price of gas, whereas in Devonport it was 3s. It would be impossible to get from gas-lamps the same light as from electric arc lamps.

The Town Clerk (Mr. A. B. Pilling) said the report as it stood committed the Council to an increased expenditure of £436 per annum. The Committee took the view that electric arc lighting was a luxury; but if the Council liked to assume the responsibility of increasing the £436, the Committee had no objection.

The Electrical Engineer (Mr. Furness) replying to questions, said the more arc lamps the Committee ordered the more would the first cost be proportionately reduced. The electric light undertaking was their own property, and the more they paid to it the less they paid to the owners of the gas undertaking, which was not. But they must draw the line somewhere.

It was decided to add one street (Albert Road), to the list of those to be lighted by electricity; and with this alteration the report of the Committee was adopted.

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INSTRUCTIONS.

The Brass Plate has holes around its edge, numbered; these indicate the feet delivered for the Coin used
To set the Meter, note Figs. I., II., III., IV.

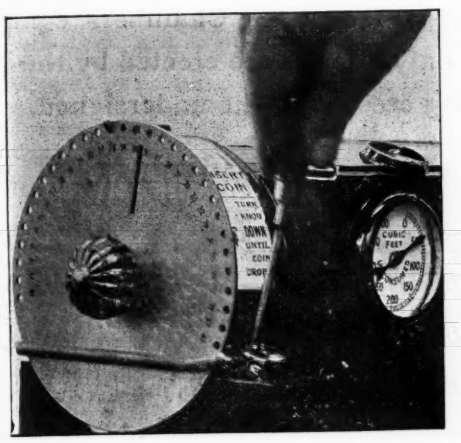

Fig. I.
Break Company's Seal and Remove Screw—THUS.

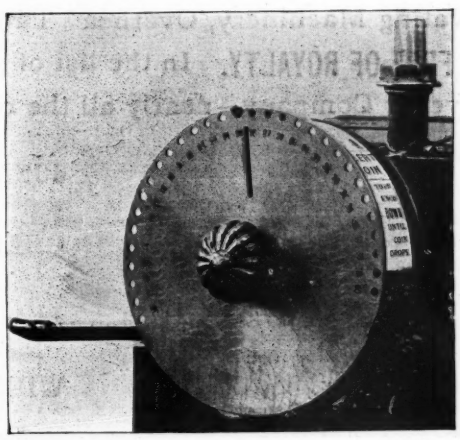

Fig. II.
Swing Band Back—THUS.

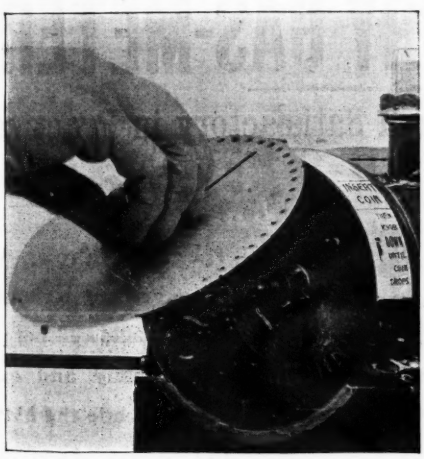

Fig. III.
Lift Plate Off—THUS.

Fig. IV.
Replace Plate—THUS.

Swing Band Forward—Replace Screw—and Re-seal.

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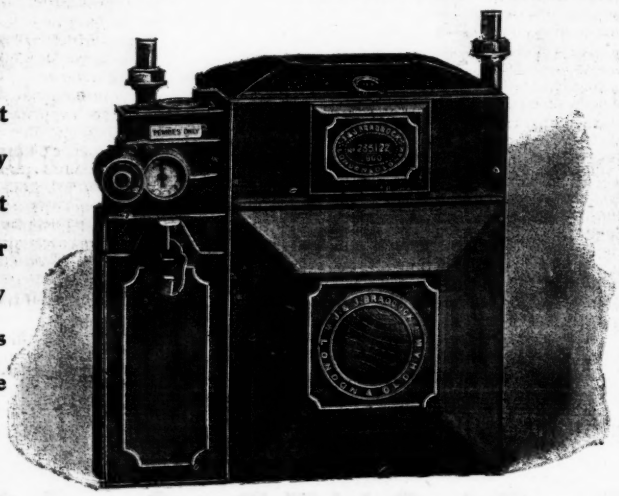

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PROVINCIAL GAS AND WATER COMPANIES.

Gas Companies.

At the half-yearly meeting of the Altrincham Gas Company on the 24th ult., the accounts submitted showed that the sale of gas in the six months ending June 30 produced a revenue of £10,327; that of residuals, one of £3256—the total receipts being £14,016. The expenditure on the manufacture of gas amounted to £6826; on distribution, to £300; and on management, to £822—the total expenditure being £8305. The balance carried to the profit and loss account was £5711, as compared with £4255 in the first half of 1899—an increase of £1456; and the amount available for distribution was £5891. Out of this, the Directors recommended the payment of the full statutory dividends, and the transfer of £1000 to the reserve fund. The quantity of gas sold in the past six months was 74,364,537 cubic feet, as compared with 63,418,574 cubic feet in the first half of 1899—an increase of nearly 11 millions, or more than 15 per cent. The present satisfactory position of the Company is due principally to the improved method of carbonizing brought into use by the Manager (Mr. J. E. Lamb) last winter. No increase in price is to be made on account of the enhanced cost of coal; and had it not been for this additional burden there would have been a reduction.

The Cork Gas Consumers' Company will hold their 63rd ordinary general meeting to day, when the accounts presented will show that in the six months ending June 30 the revenue from the supply of gas amounted to £19,744, and from the sale of residuals to £7975; the total receipts being £27,728. The expenditure having been £22,260, there was a balance of £5468 to go to the profit and loss account. The sum available for distribution is £4400, which will be insufficient by £1251 to pay the usual dividend. This amount will be taken from the reserve fund. The Directors report that coal and freights had increased; but, on the other hand, the receipts from residuals were in excess of the corresponding period of 1899. The Engineer (Mr. T. P. Travers) states that the new retort-house is practically complete, and preparations are being made to put it to work immediately. The buildings and plant have been maintained in good working order.

At the half-yearly meeting of the Douglas Gas Company yesterday week, it was stated that the profits for the half year amounted to £3617, which was slightly less than in the corresponding period of last year—the decrease being attributed to the increased cost of coal. The Chairman (Mr. J. Kaye) stated that the Directors had been approached by other Gas Companies in the island with a view to forming the Company into a limited liability concern; but they considered there was not sufficient reason to justify the change. A shareholder expressed regret at the decision, and thought the shareholders should be relieved of the anxiety which an unlimited liability entailed upon them. He hoped the Directors would reconsider the matter, and register under the Limited Liability Act, as the Castletown Gas Company had done.

At the half-yearly general meeting of the Eastbourne Gas Company on Monday last week, the Chairman (Dr. G. A. Jeffery, J.P.), in moving the adoption of the report, which was noticed in the "JOURNAL" for the 21st ult., expressed the pleasure he and his colleagues felt at being able to present so satisfactory an array of figures as the proprietors had before them in the accoun's. The quantity of gas sold had been 142,801,100 cubic feet; being an increase of 14,454,000 cubic feet, or upwards of 11 per cent., on the sale in the first half of last year. The profit was £7967, against £6187—an increase of £1780. Coals had cost £2558 more; but residuals had brought in £2073 extra, which had really recouped the Company to a great extent for the exorbitant price they had to pay for their raw material. The income from gas supplied, &c., was greater by £2296. The dividends required £6783; and the surplus, after paying these, was £1184. The gas produced was 151,593,100 cubic feet, against 134,509,000 cubic feet last year. The leakage was 4·63 as compared with 3·45 per cent., which was rather higher; but, taking the average of the years, it was very good. The plant and machinery were in capital working order. The new tank and holder were nearly finished. When completed, the holder would have a capacity of 2 million cubic feet. The new plant erected by Messrs. Humphreys and Glasgow was finished, and was giving every satisfaction. There was only one blot upon the fair chapter of the Company's history, and that was the high coal bill; and the question arose as to whether or not they should increase the price of gas in consequence. They had discussed the matter with their Consulting Engineer (Mr. H. E. Jones), with their Manager (Mr. J. Hammond), and with their Auditor (Mr. Worley), and they believed the present exorbitant price of coal was only temporary—that it would soon come down again. They knew what their coal bill would be to the end of 1901; and, believing as they did in their good management and in their capabilities, they had decided not to raise the price of gas. But, of course, if coal went up, they must increase their charge to safeguard themselves. Mr. J. Farncombe, in seconding the motion, remarked that the Company had been paying large dividends for many years, and it was natural that the consumer should think that when they had a severe time a little consideration should be shown on both sides. As there was to be no increase in the price of gas, he thought they had nothing to complain about. Should the time come when the price of coals would be so great that the Directors must raise the charge for gas, he thought the shareholders would be quite prepared to meet them half way, and take a little less dividend. Mr. A. W. Oke, referring to the decision of the Directors as to not raising the price of gas, said the consumers ought to be very grateful, and show their appreciation by an extremely large increase. He went on to remark that there were one or two very hopeful signs in connection with gas companies. One was the increase which seemed to be going on throughout the country, and which was in many cases large. It was very steady. There was also a point which was of vast importance to gas companies, and that was the tendency to return to the 14-candle standard. The victory achieved by the South Metropolitan Gas Company on this point was one which was likely to have far-reaching effects; and perhaps it would do more to produce gas at a low price, and therefore benefit the consumers, and eventually the shareholders, than anything else that had been done by the Legislature for years past. The motion was carried unanimously. A vote of thanks having been accorded to the Chairman and Directors, Dr. Jeffery, in responding, proposed a similar vote to the Manager, of whose services to the Company he spoke very highly. Mr. Towner, in seconding the motion, bore out the observations of the Chairman. The motion having been heartily carried, Mr. Hammond, in acknowledging the compliment, said he had always endeavoured to do his duty loyally.

The half-yearly general meeting of the Enfield Gas Company was held at the Company's offices last Tuesday—Colonel Somerset in the chair. The sale of gas during the half year ending the 30th of June, shows an increase over the quantity sold in the corresponding period of the previous year equal to 14·83 per cent. The profit amounted to £3194. Of this the fixed charges would absorb £309, and the dividend on the consolidated preference stock would take £630. Out of the remaining £2255, the Directors recommended the declaration of a dividend of 5 per cent., amounting to £2091, which would leave £164 to be added to the undivided profit accrued from previous years. The Chairman, in moving the adoption of the report and accounts, referred to the progress made by the Company during the last ten years. Mr. A. L. Ford seconded the motion, and it was carried. The dividend recommended was then declared. Mr. Ford remarked that the increase in the sale of gas during the half year had been really enormous; and he attributed it to the growth of the town and the increased price of coal. His opinion was that the latter circumstance had been an advantage to them rather than otherwise, as it had enabled them to sell their coke at a higher figure. A question having been asked as to whether American coal was equal to that which was being used at the present time, Mr. Ford replied that he remembered reading a statement to the effect that big companies never found it a success; and therefore it would be better for Enfield not to try it until they knew more about it. A vote of thanks was accorded to the Secretary and General Manager (Mr. C. W. Offord) for his services, which he suitably acknowledged, and the proceedings closed.

At the annual meeting of the Falmouth Gas Company, on Monday last week, the Chairman (Mr. J. Mead), in moving the adoption of the report, said that, with all the competition coming from other forms of illumination, the consumption of gas in the past year was unprecedentedly large. When coupling with this fact the circumstance that they were working very largely under the incandescent system, it would be seen that the real increase must have been, at least, at the rate of 10 or 12 per cent. Coal had risen in price to such an extent that the Company were compelled to put up the price of gas to 4s. 2d. per 1000 cubic feet. At present, coal was costing them 100 per cent. more than it did last year; and in the future there would be a difficulty in making both ends meet. Of the 10 or 12 per cent. advance in consumption, barely 1 per cent. was attributable to the Corporation for public lighting. He believed that their works were among the best in the West of England. This year they were spending over £900 in plant, notwithstanding the large outlay of twelve months ago. It was an interesting fact that in the last ten years the consumption of gas had increased more than 50 per cent. Mr. W. N. Carne seconded the motion. Mr. W. Rowe, in supporting it, mentioned that this year they had purchased coal at 16s. and 17s. per ton, which was a very advantageous contract, seeing that on the previous Saturday it was quoted at 20s. in Newcastle. The Chairman further remarked that the rise in the price of coal would increase the Company's expenses by about £1800; while the advance in the charge for gas would be a bare £1200. It was hoped to meet the deficiency of £600 without lessening the dividends. There was still something in the reserve fund; and he trusted this would help them through. Referring to the supply of water gas, he stated that in the past year only 13 per cent. had been used. Mr. W. Rowe mentioned that complaints about water gas were received at a time when the Company were actually not making it.

Considerable progress in the business is reported by the Directors of the Gloucester Gas Company. In the half year there has been a large addition to the number of prepayment meter consumers, and also a good demand for cooking-stoves; resulting in a great increase in the sale of gas. This, coupled with the advance in the receipts from residuals, has considerably improved the revenue. The expenditure for coal has increased; but during the half year the Company have not been seriously affected by the generally advanced price. Contracts have, however, been arranged for this year at much higher figures, in consequence of which the Directors felt obliged to advance the price of gas by 3d. per 1000 cubic feet from the commencement of the current half year. To meet the continually increasing consumption of gas, it has been decided to erect an additional gasholder, which work is now in progress. During the half year £5000 of new consolidated stock was sold by auction, realizing an average of £125 per cent. The net profit for the half year, after providing for interest on mortgages and other charges, is £4705, from which the Directors recommend the payment of 5 per cent. per annum upon the consolidated ordinary stock. This will absorb £3928, and leave £777 to be carried forward.

The annual meeting of the Hartlepool Gas and Water Company was held last Thursday, under the presidency of Mr. W. H. Fisher. He congratulated the shareholders on the satisfactory report presented, although the surplus a year ago had been entrenched upon by the large increase in the cost of coal, which had been equivalent in that period to £15,000, or 10d. per 1000 cubic feet on the cost of gas. They had hoped by the improved price of residuals to counterbalance this; but it only amounted to half the additional cost. Still, the Directors had decided to raise the charge for gas only 5d. per 1000 feet from July 1 last. The year's revenue was £30,071, which, owing to the higher cost of coal and the advance in wages, left a decrease of £1827 in the net revenue. The Directors recommended a dividend at the rate of 10 per cent. per annum on the "A," 7½ per cent. per annum on the "B," and 7 per cent. per annum on the "C" and "D" shares for the last half year, in all cases clear of income-tax. The Bill for the consolidation and conversion of the Company's share capital into a 5 per cent. maximum ordinary stock, and for power to raise additional money, received the Royal Assent on the 30th of July, and would come into operation on Jan. 1, 1901. There was an increase of 28 million cubic feet in the consumption of gas in the twelve months. The report was adopted.

In the report which the Directors of the Hastings and St. Leonards Gas Company will present to the proprietors at the half-yearly meeting on Thursday, they express their pleasure in again being in a position to announce a satisfactory increase in the Company's business; the quantity of gas sold in the six months ending June 30 being 10·4 per cent. more than in the corresponding period of 1899. Unfortunately, the coal market, instead of becoming easier, advanced very much during the half year; and the Directors, finding that the cost of coal would be increased by 80 per cent. over what had been paid during the last two years (equal to

about 9d. per 1000 cubic feet), and that other materials had also increased in price, gave notice that the charge for gas would be advanced 4d. per 1000 cubic feet from the commencement of the present half year. They much regretted the necessity for taking this course, in the interests of both consumers and shareholders; and they hope the advance may only be of short duration. Large extensions of mains were made during the half year; an additional lift is being added to one of the gasholders, and increased purifying and boiler power is being also provided for. The accounts accompanying the report show that the sale of gas for public and private lighting produced a revenue of £32,941; the rental of meters brought in £2112; and the sale of residual products, £8971—the total receipts being £44,173. The expenditure on the manufacture of gas was £27,489 (coal, oil, &c., costing £18,516, and the coal duty paid to the Corporation of Hastings amounting to £2003); on distribution, £2683; and on management, £1824—the total expenses being £34,158. The balance carried to the profit and loss account is £10,015; and the amount of net profit available for distribution is £51,678. The Directors propose to pay a dividend at the rate of 6½ per cent. per annum on the converted 5 per cent. stock, and one of 5 per cent. per annum on the 3½ per cent. converted stock, both less income-tax; carrying forward the balance. Under the supervision of Mr. Charles E. Botley, M.Inst.C.E., the Company's Engineer and Manager, 16,578 tons of coal, 252 tons of cannel, and 126,227 gallons of oil were employed in the production of 223,127,000 cubic feet of gas (including 49,661,000 cubic feet of oil gas), of which 212,538,000 cubic feet were sold and 214,769,200 cubic feet accounted for. The estimated quantities of residual products were: Coke, 10,355 tons; breeze, 1088 tons 15 cwt.; tar, 175,961 gallons; and ammoniacal liquor, 321,830 gallons.

The report presented by the Directors of the Normanton Gas Company at the recent half-yearly meeting showed that the amount available for distribution was £3146, out of which the payment of dividends of 5½ per cent on the original and 4 per cent. on the additional stock was recommended. The Chairman (Mr. E. Mitchell, J.P.), in moving the adoption of the report, said that in the six months ending June 30 coal had cost £1191—a rise of £291 on the corresponding period of 1899 for the same quantity; £200 of this amount being due to the advanced rate. There had been an increase in the cost of carbonizing, in consequence of an advance of wages. Recently, the Directors made a new arrangement with the men on the bonus system, which promised to work well. They made the men partners to some extent in the success of the concern. Up to the present the scheme had worked very satisfactorily, and had resulted in a considerable increase in the wages of the men. It was the best scheme they had adopted since he had been connected with the Company. They had always had more or less friction; but if the scheme worked as well in the future as it had done during its short existence, he believed they would get rid of this trouble. The total income was £3651, and the expenditure £3157. There was a balance for the half year of £1244, against £1179 in the corresponding period of 1899; being a net increase of £65. Referring to the price of coal, the Chairman said the Company would have to bear an advance of 5s. per ton; but they hoped, by the higher price they obtained for residuals, to nearly make it up. They had just accepted contracts for coke for the ensuing twelve months, at a price which was a very considerable advance on last year's figures—something like 5s. per ton more. They could all form their own opinion as to the probability of the price of coal keeping up. Speaking as one intimately connected with the trade, he could not see that it would go down for some time—perhaps not in twelve months. The price would harden in the coming autumn, and perhaps on the 1st of October. The report was adopted, and the dividends recommended were declared.

At the Northwich Gas Company's half-yearly meeting on Wednesday, it was reported that the sales of gas for the half year ending June 30 exceeded the corresponding period of last year by 10 per cent. There was also a marvellous increase in the prepayment meter system. It was resolved to pay an interim dividend of 4 per cent., and to carry forward £213. It was reported that the distribution system was being extended to the village of Barnton.

The half-yearly general meeting of the Portsea Island Gas Company was held on the 25th ult., under the presidency of Alderman Sir John Baker, M.P., J.P. The report for the half year ended the 30th of June, which was taken as read, showed that the consumption of coal in that period had been 40,521 tons of common coal and 1940 tons of cannel; the figures in the corresponding period of last year having been 35,978 and 1933 tons respectively. The quantity of gas manufactured had been 440,536,000 cubic feet—an increase of 36,259,000 cubic feet; the quantity sold, 412,682,600 cubic feet, or 40,699,400 cubic feet more; and the quantity not accounted for, 24,205,100 cubic feet, which was less by 4,113,500 cubic feet. The half-year's income had been £71,700—an increase of £12,620; and the expenditure had been £58,914, against £44,826. Altogether, there was an available balance of £35,232, from which the Directors recommended the payment of dividends at the rate of 13 per cent. per annum on the "A" and "B" shares, of 12 per cent. per annum on the "C" shares, and of 5 per cent. per annum on the stock (less income-tax); leaving a balance of £23,039 to be carried forward. The Chairman, in moving the adoption of the report, referred to the troubles in South Africa and in China, and to the social disturbances caused by the unsettled condition of the labour market. He congratulated the proprietors on the fact that, as a Company, they had been exempt from the effects of difficulties which, as a consequence, might have fallen upon them, especially with regard to their supply of coal; for, owing to prudence and foresight, their contract for coal, as he explained at their last meeting, was secure until next June, by which time he trusted there would be a relaxation of that stringency of circumstances which had fallen upon the country, and they would be carried over the troubles. He thought he need not say very much as to their works, at which the plant had been very considerably increased. With regard to revenue, the meter and stove rentals alone had risen by £700; and the other sources of income had also improved. The Vice-Chairman (Alderman Sir W. D. King) seconded the motion, and it was unanimously agreed to. The payment of the ordinary dividends was next sanctioned. The meeting was then made special, and it was resolved that debenture stock to the amount of £25,000, at 4 per cent., should be raised by the Directors in such manner and in such amounts as they thought fit.

At the recent meeting of the Salisbury Gas Company, the Chairman (Mr. G. Fullford), in moving the adoption of the report and accounts, and the payment of the usual dividends on the various classes of shares, ranging from 5 to 10 per cent. per annum, observed that the results of the past year's working were satisfactory. The sales of gas and residual products had been well maintained, and showed a good advance. He congratulated the shareholders on the continued prosperity of the undertaking. In common with all users of large quantities of coal, iron, &c., the Company had experienced a considerable increase in expenditure; but, on the whole, they could look favourably on the past year's working. The works, mains, and plant belonging to the Company had been maintained in excellent order. The motion was carried unanimously. A vote of thanks having been accorded to the Chairman, Directors, and officers of the Company, the Chairman, in acknowledging it, expressed their indebtedness to the Manager (Mr. N. H. Humphrys) and the staff generally for their services. Mr. Humphrys, in responding, said the past twelve months had been eventful in many ways. Apart from the excitement due to the war, there had been difficulty in getting coal, though he was glad to say there was plenty of it now. They had done their best to keep up to the times, and avail themselves of all modern appliances.

The Sunderland Gas Company will hold their annual meeting to-morrow, when the Directors will present accounts showing that the revenue from the sale of gas and from meter-rents in the twelve months ending June 30 amounted to £79,326; and from the sale of residuals, to £38,989—the total revenue being £118,352, as compared with £105,211 in the preceding year. On the expenditure side of the revenue account, coals, lime, &c., cost £51,831, against £39,699; and the total expenses were £105,770, as compared with £89,686. The balance on the year's working is £12,582. In their report, the Directors state that the additional cost of coals, other materials, and labour of £16,083 was reduced by an increased revenue of £13,140 from gas and residuals. They hoped that, before the arrival of the time for entering into new contracts, coals would have resumed their normal price. So far from this being the case, they have had to purchase at an increase of 6s. per ton; involving an additional cost, on this head alone, of £30,000 for the year now current. Under these circumstances, and as the price of residuals, which has been the saving feature of the past year, cannot be expected to increase to any appreciable extent, the Directors, in common with other companies and municipal corporations, were compelled to advance the price of gas. An interim dividend was paid in March last; and by drawing upon the reserve balance, the Directors are enabled to recommend the payment of a like dividend of 5 per cent. on the original stock, and of 4½ per cent. on the additional capital stock of the Company (less income-tax).

The Tonbridge Gas Company held their half-yearly meeting on Monday last week. The Chairman congratulated the shareholders on the successful working of the undertaking in the past six months. He remarked that, although there had been an increase in the cost of coal, the profit was considerably in excess of that realized in the corresponding period of last year; and they were able to pay full dividends under the sliding-scale, and carry forward a very substantial sum. The increase in the consumption of gas was 12·16 per cent. Gas cooking and heating appliances were still in demand. The profit was £2000; and the amount available for distribution £5402. The receipts for gas and residual products exceeded those for the corresponding period of last year by £1113; while the expenditure was £744 more. The Directors regretted to announce an increase of 4d. per 1000 cubic feet in the price of gas. Carburetted water-gas plant, of a capacity of 300,000 cubic feet per day, was being erected by the Economical Gas Apparatus Construction Company, Limited, and would be in operation in about two weeks. The business terminated with a vote of thanks to the Directors, and also to the Engineer and Secretary (Mr. James Donaldson).

The shareholders of the Worthing Gas Company held their half-yearly meeting on the 25th ult., under the presidency of Mr. H. H. Gardner. The report presented showed that the Company's capital is now £88,197, and that during the six months covered by it £1277 had been spent on extensions. It would, however, require another £1000 to be laid out before the whole scheme already agreed to would be complete; but when it was, the Company hoped to be in a position to comply with the requirements of the district for some few years. On the revenue account, there was a substantial improvement all round—the increase on the sale of gas having produced £826, and on meter and stove rentals £73; while £537 had come in from coke, and £94 from the sale of breeze and tar. The net increase had been £315, notwithstanding that the higher cost of everything had raised the expenditure by £1206. The report was unanimously adopted; and the Directors expressed the hope that the additional 3d. per 1000 cubic feet of gas which they had had to put upon the price would be sufficient to meet the increased cost of coal.

The Chairman of the Wolverhampton Gas Company (Mr. Henry Ward) had a very pleasant account of their operations to lay before the shareholders at their meeting yesterday week. In moving the adoption of the report and accounts (which were noticed in our last issue), he congratulated the shareholders on the fact that, owing to successful work, they were able not only to pay the usual dividend, but to carry forward a good balance. They had been able to contribute considerable sums towards the replacement of the retorts which had been abandoned now that the old works at Horseley Fields had been finally closed. As regarded the accounts, it was proof of the successful expenditure of capital that the proceeds from gas were £2236 more than they were twelve months ago. This was evidence that they were making a great saving in the leakage, which had for so many years been their misfortune. There was no doubt that it would have paid them to have taken up many of the mains years ago; for he did not think that there was hardly a gas-works in the kingdom where the loss from leakage had been so great as in Wolverhampton. With less gas made, they had been able to sell many million feet more; for whereas the leakage last year averaged from 15 to 20 per cent., they had brought it down this year to 12 per cent., and hoped to do even better than this. With respect to the cost of coal, they were fortunate in having bought pretty well last year; and their contracts would carry them fairly well into next half year. Whether the additional 3d. per 1000 cubic feet they had imposed on their customers would cover the extra £15,000 required for the increased price of coal, was uncertain; and gas companies held different views as to the amounts which would be realized from the sale of coke. It was a matter of opinion whether the price of coal would keep up or go down; but he did not think they would see much reduction

before March or April next. The sale of residual products, such as coke, tar, and liquor, returned about £5370 more than a year ago. The bulk of this was due to the increased price of coke; for on the sales of tar they had had to make little concessions. So far, they felt that the large expenditure of capital on new mains had well repaid itself; and they were going to finish the works at Stafford Road according to the original design of Mr. George Winstanley, of Coventry. When these were finished, he thought they would not require further capital outlay for some years. The report was adopted, and the dividends declared. A resolution was then passed increasing the capital by the creation and issue of £30,000 of new ordinary stock, entitled to a standard rate of dividend of 6 per cent. The Chairman explained that the £30,000 was not all required at once; and not more than £10,000 or £15,000 would be offered for immediate sale. If the present high price of coal continued, it might be necessary for them to erect a water-gas plant; but this was not in contemplation at present.

Water Companies.

The Barnstaple Water Company held their half-yearly meeting on Monday last week. The Directors recommended that out of the disposable balance of £1630 a dividend of 10s. per share on the "A" shares and of 7s. per share on the "B" shares should be paid. This would absorb £880, and leave £750 to be carried forward. The recommendation was agreed to.

The half-yearly general meeting of the East Worcestershire Water Company was held last Thursday—Lord Windsor presiding. In moving the adoption of the report, noticed in the "JOURNAL" for the 21st ult., the Chairman said the demand for water during the six months ending in June had been on the increase; but it had been satisfactorily met by the Company. The new works at Washingstocks were still in progress. The first borehole had been sunk to the full depth of 307 feet; but during the sinking Mr. Marten, the Engineer, found that the soil was scarcely suitable for the foundations of the engine house and chimney it was proposed to erect, and consequently another site was selected, and the sinking of a second hole had been commenced. The work at the first hole was not stopped because the Directors thought it was important, considering the increased demand, and the fact that the driest part of the summer was approaching, that the hole should be completed so that the water might be available at the earliest possible moment. Complaints had been made that the pressure in the main from Bromsgrove was not sufficient. This was due to the largely increased demand on the part of Droitwich. In one week, something like 130,000 gallons per day were taken by Droitwich, although the original contract with that town was only for the supply of 50,000 gallons per day. The temporary pumping plant erected upon the first borehole, however, enabled them to overcome the difficulty. The main was connected with the Bromsgrove main, thereby increasing the pressure and the supply; and the complaints from Bromsgrove were ended. Experience showed that they must be prepared to meet the extra demands that were made upon them; and he believed the steps taken to enlarge their equipment would be completed before next summer. In accordance with the resolution passed in February, a *pro ratâ* allotment of shares at a premium of £2 10s. each was offered to the shareholders; and of the 617 shares authorized 447 had been allotted. The premiums received, amounting to £1117 10s., had been placed to the credit of a reserve fund, apart from the fund for depreciation of plant. Mr. C. P. Noel seconded the resolution, which was carried; and a vote of thanks to the Chairman for presiding terminated the meeting.

The report presented to the shareholders of the Exmouth Water Company at the half-yearly meeting on Tuesday last referred to the passing of the Act conferring upon the Urban District Council power to purchase the undertaking. Notice has already been given by the Council of their intention to carry out the purchase; and it is anticipated that the arbitration to determine the price to be paid will be held before the end of the year. The accounts showed that the sum of £1090 was available for distribution; and the Directors recommended payment of the maximum dividends—leaving a balance of £18 to be carried forward.

At the half-yearly meeting of the Maidstone Water Company last Thursday, the Chairman (Mr. H. W. Tyrwhitt-Drake) alluded in feeling terms to the loss the Company had sustained by the death of Alderman C. Ellis, to which reference is made in our "Obituary" column, who had been a Director for many years, and had done exceedingly good work on the Board. He then referred to the resignation by Mr. Marsham of the chairmanship of the Company, and to the honour conferred upon himself by selecting him to fill the position thus rendered vacant, expressing the hope that, with the assistance of the Board and the indulgence of the shareholders, he would be able to carry out the policy of his predecessor—namely, that of supplying the town with the best water, at the same time carefully looking after the interests of the shareholders. He moved the adoption of the report, which was noticed last week. He said the amount of interest was the same as for the previous half year, but was an increase on that for the first six months of 1899. This, he thought, showed a slight progress. Mr. J. Etherington seconded the motion; and it was carried unanimously. The Chairman next offered a few remarks on the subject of the works, and read the results of the chemical analysis of the water by Professor Gregory, which showed that it was of exceedingly good character. He went on to say that Dr. Sims Woodhead had been down to Maidstone and had prepared a voluminous report. He said the East Farleigh filters were in good condition and working well, and that the water passed through them was of a good bacteriological quality and satisfactory in every way. At Boarley, he was much pleased with the arrangements made for the protection of the collecting wells against contamination, and found the water very good. The springs at Cossington were well protected, and the water of very good character from a bacteriological point of view. Their new borehole at Forstal furnished water of excellent quality. He congratulated the Directors on the capital arrangements made for the sufficient supply of water of great purity. A vote of thanks was accorded to the Directors and officials, and the proceedings closed.

The report which was presented at the half-yearly general meeting of the South Staffordshire Water Company last Thursday was noticed in the "JOURNAL" for the 14th ult. In moving its adoption, Mr. Frank

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 575.

Issue.	Share	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment	Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.	£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 11	10½	Alliance & Dublin 10 p. c.	18½–19½	..	5 7 8	60,000	5	Feb. 23	7	Ottoman, Ltd. . . .	5–5½	..	6 7 3
100,000	10	,,	7½	Do. 7 p. c.	13½–14½	..	5 3 5	500,000	100	June 1	6	People's Gas 2nd Mtg. of Chicago Bonds .	102–106	..	5 13 2
800,000	100	July 2	5	Australian 5 p. c. Deb. .	101–103	..	4 17 1								
200,000	5	May 16	6	Bombay, Ltd. . . .	6–6½	..	4 12 4	851,070	10	Apl. 27	7	River Plate Ord. . . .	10½–10¾	..	6 10 2
40,000	5	,,	6	Do. New, £4 paid .	4–4½	..	5 6 8	250,000	Stk.	June 28	4	Do. 4 p. c. Deb. .	99–101	..	3 19 8
880,000	Stk.	Aug. 15	12	Brentford Consolidated	245–255	..	4 14 1	250,000	10	Apl. 11	8	San Paulo, Ltd. . . .	11½–12½	..	6 8 0
270,000	,,	,,	9	Do. New . . .	177–182	..	4 18 11	135,000	Stk.	Mar. 14	10	Sheffield A.	246–247	..	4 1 0
50,000	,,	,,	5	Do. 5 p. c. Pref. .	140–145	..	3 9 0	209,700	,,	,,	10	Do. B.	244–246	..	4 1 4
159,375	,,	June 14	4	Do. 4 p. c. Deb. .	116–120	..	3 6 8	447,427	,,	,,	10	Do. C.	244–246	..	4 1 4
220,000	Stk.	Mar. 14	10†	Brighton & Hove Orig. .	225–235	..	4 5 1	5,641,885	Stk.	Aug. 15	5½	South Metrop., 4 p.c. Ord.	127–129	+1	4 2 7
226,320	,,	,,	7†	Do. A. Ord. Stk. .	155–165	..	4 4 10	1,520,000	,,	July 12	3	Do. 3 p. c. Deb. . .	94–97	..	3 1 10
1,009,500	Stk.	Feb. 23	5	Bristol, 5 p. c. max. .	125–130	..	3 16 11	380,940	Stk.	May 16	5	Southampton Ord. . .	115–120	..	4 3 4
420,000	20	Mar. 29	10	British	39–41	..	4 17 7	70,825	,,	July 12	4	Do. 4 p.c. Deb.	117–122	..	3 5 7
50,000	10	Aug. 15	12	Bromley, Ord. 10 p. c. .	24–26	..	4 12 4	120,000	Stk.	Aug. 30	6	Tottenham A. 5 p.c. and B. 3½ p.c.	102–107*	+2	5 12 2
79,000	10	,,	9	Do. 7 p. c. . . .	19–21	..	4 5 8	250,520	,,	,,	4½		80–85*	+2½	5 5 11
500,000	10	May 16	6	Buenos Ayres (New) Ltd.	8⅝–9½	..	6 9 9	61,550	,,	June 14	4	Edmonton 4 p. c. Deb.	111–115	..	3 9 7
220,000	Stk.	June 14	4	Do. 4 p. c. Deb. .	98–100	..	4 0 0	182,380	10	Jan. 12	5	Tuscan, Ltd.	7–8	..	6 5 0
150,000	20	July 12	8½	Cagliari, Ltd. . . .	23–25	..	6 12 0	149,900	10	July 2	5	Do. 5 p. c. Deb. Red.	98–102	..	4 18 0
100,000	10	June 14	8	Cape Town & Dis., Ltd.	13–14	..	5 14 4								
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	55–57	..	5 5 3								
550,000	Stk.	Apl. 11	13½	Commercial Old Stock .	270–280	..	4 16 5								
286,425	,,	,,	10½	Do. New do. .	205–215	..	4 17 8								
288,237	,,	June 14	4½	Do. 4½ p. c. Deb. .	133–138	..	3 5 3								
800,000	Stk.	May 31	9	Continental Union, Ltd.	158–163	..	5 10 5								
200,000	,,	,,	7	Do. 7 p. c. Pref. .	170–175	..	4 0 0								
51,600	Stk.	Feb. 23	14	Croydon A 10 p. c. . .	335–340	..	4 2 4	780,404	Stk.	June 28	11	WATER COMPANIES. Chelsea, Ord.	295–300	+7	3 13 4
178,400	,,	,,	11	Do. B 7 p. c. . .	265–270	..	4 1 5	150,000	,,	,,	5	Do. 5 p. c. Pref. .	155–160	..	3 2 6
555,000	Stk.	Aug. 15	5½	Crystal Palace Ord. 5 p. c.	107–112	..	4 13 9	160,000	,,	,,	4½	Do. 4½ p. c. Pref. '75	143–148	..	3 0 10
60,000	,,	,,	5	Do. 5 p. c. Pref. .	130–135	..	3 14 1	175,785	,,	Mar. 29	4½	Do. 4½ p. c. Deb. .	145–150	..	3 0 0
486,090	10	July 27	11	European, Ltd. . . .	19–20	..	5 10 0	1,720,560	Stk.	Apl. 11	7	East London, Ord. . .	190–195	+5	3 11 10
354,060	10	,,	11	Do. £7 10s. paid .	14–15	..	5 10 0	654,740	,,	June 14	4½	Do. 4½ p. c. Deb. .	147–152	..	2 19 3
14,993,075	Stk.	Aug. 15	4 4/5	Gas- 4 p. c. Ord. . .	97–99	+1	4 8 10	890,000	,,	,,	3	Do. 3 p. c. Deb. .	96–98	..	3 1 3
2,600,000	,,	,,	3½	light 3½ p. c. max. .	92–94	..	3 14 6	700,000	50	June 14	7½	Grand 10 p. c. max. .	107–110	..	3 8 2
3,799,735	,,	,,	4	and 4 p. c. Con. Pref.	114–117	..	3 8 5	810,000	Stk.	Mar. 29	4	Junction 4 p. c. Deb. .	130–135	..	2 19 3
3,993,975	,,	June 14	3	Coke 3 p. c. Con. Deb.	93–95	..	3 8 2	708,000	Stk.	Aug. 30	14	Kent	290–300*	+2	4 13 4
70,000	10	May 31	8	Hongkong & China, Ltd.	13½–14½	..	5 10 4	160,000	,,	,,	7	Do. New, 7 p. c. max. .	200–210*	+3½	3 6 8
3,800,000	Stk.	May 16	10	Imperial Continental .	200–205	..	4 17 7	1,043,800	100	June 28	10½	Lambeth, 10 p. c. max. .	282–287	+4	3 13 2
473,600	Stk.	Aug. 15	3½	Do. 3½ p. c. Deb. Red,	99–101	..	3 9 4	406,200	100	,,	8	Do. 7½ p. c. max. .	205–210	+2	3 16 2
75,000	5	June 14	6	Malta & Medn., Ltd. .	4½–5	..	6 0 0	350,000	Stk.	Mar. 29	4	Do. 4 p. c. Deb. .	128–132	..	3 0 7
560,000	100	Apl. 2	5	Met. of 5 p. c. Deb.	107–110	..	4 10 11	500,000	100	Aug. 15	14	New River, New Shares	410–415	+2	3 7 6
250,000	100	,,	4½	Melbourne 4½ p. c. Deb.	106–108	..	4 3 4	1,000,000	Stk.	July 27	4	Do. 4 p. c. Deb. .	123–133	..	3 0 2
541,920	20	May 31	3½	Monte Video, Ltd. . .	10½–11½	..	6 1 8	902,300	Stk.	June 14	7½	South- Ord. . . .	193–198	+1	3 15 9
667,946	Stk.	Aug. 10	9½	Newc'tle & Gatesh'd Con.	210–215*	..	4 6 1	126,500	100	,,	7½	wark 7½ p. c. max. .	182–187	..	4 0 3
299,855	Stk.	June 28	8½	Do. 8½ p. c. Deb. .	104–107	..	3 5 5	489,200	Stk.	,,	5	and 5 p. c. Pref.	155–160	..	3 2 6
150,000	5	May 16	8	Oriental, Ltd. . . .	7½–7¾	..	5 3 8	1,019,585	,,	Apl. 11	4	Vauxhall 4 p. c. A Deb.	129–134	..	2 19 9
135,000	5	,,	8	Do. New, £4 10s. pd.	6–6½	..	5 10 10	1,155,066	Stk.	June 14	10	West Middlesex . . .	272–277	..	3 12 3
15,000	5	,,	8	Do. do. 1879, £1 pd.	14–15	..	4 11 5	200,000	,,	,,	4½	Do. 4½ p. c. Deb. .	140–145	..	3 2 1
					* Ex. div.			200,000	,,	Mar. 14	8	Do. 8 p. c. Deb. .	98–100 *Ex div.	..	3 0 0

† Next dividend will be at this rate.

James said that, like all other companies consuming coal, they had to regret that what individually he should call its insane price had, during the period covered by the report, made itself considerably felt in the expenses they had incurred. The engine charges were £9115, against £7224 during the preceding six months, and £6021 in the first half of last year. It would be seen, therefore, that coal had cost them half as much again. He did not mean that the full amount of the increase was due to the higher price. The extra quantity of water pumped had made the bulk of coal consumed greater. The increased price was responsible for £1244, and the additional pumping £1700. He could not hold out any hope that during the next six months they would receive any advantage from lower prices. They were obliged to meet the demands for water, and, therefore, it was impossible to work from hand to mouth with regard to coal. They must contract ahead, and, in addition, keep a stock for fear of accidents. Maintenance of works had cost £6350, against £3953 in the corresponding period. The total balance carried down was £25,551, against £26,537. On the other side of the account, there was a considerable increase in water-rates, which amounted to £54,175, against £51,408. The total result of the figures was that having £25,551, with the balance of £9722 brought forward, they paid the same dividends as last year, though this really meant that they paid a little more, for the dividends were free of income-tax, which was now 1s. instead of 8d. in the pound, and they carried forward £7701. He did not know whether the price of coal was going to reduce their dividends; but certainly it would reduce the amount of their balance. As to the capital account, they had been busy, having spent upwards of £50,000 on an addition to one of their pumping stations and on two new ones, independent of the ordinary main laying. There had been 2176 houses added during the half year, and the tendency was in the same direction during August. With regard to capital, they had come to the limit of their parliamentary power, and either at their next meeting or before the Directors would have to get permission to apply for power to increase it. Sir Henry Wiggin seconded the motion, and it was carried. The dividends recommended were declared; and the proceedings closed with the usual compliment to the Chairman.

The ordinary half-yearly general meeting of the Woking Water and Gas Company was held last Tuesday, at the London Offices, Great Winchester Street, E.C.—Mr. R. Hesketh Jones, J.P., presiding, in the absence of the Chairman (Mr. Charles Horsley, J.P.) through indisposition. In moving the adoption of the report and accounts, noticed in the "JOURNAL" for the 21st ult., he remarked that there was a balance of £2226 to the credit of the profit and loss account, and it was proposed to pay a dividend at the rate of 4½ per cent. per annum, less income-tax, which would absorb £1919, and leave £307 to be carried forward. He said he was pleased to inform the shareholders that the quantity of water pumped during the past half year had been 66½ million gallons, as compared with 57 million gallons for the corresponding period of 1899. There had been laid 6088 yards of new mains; and 181 new services had been connected, the full benefit of which had not yet been realized, but would show itself in the current six months. The supply to the district had been satisfactorily maintained. At the last two August meetings, they had had to apologize for having had to curtail the supply; but this year there had been no occasion to restrict it, and this must be regarded as very satisfactory. Negotiations were practically complete for the acquisition of the site on the Thames for the new-works authorized by the Company's Act of last year, and their construction would be proceeded with at an early date. The Company were in a much stronger position now than they had ever been; and he hoped that at their next August meeting it would be the pleasure of the Chairman to announce that the consumers were being supplied with water from the Thames as well as from the existing sources. Sir John Baker seconded the motion; and it was carried. The dividend recommended was then declared; the Chairman remarking, in acknowledging the vote of thanks to the Directors, that the proprietors must not expect a higher rate than 4½ per cent. for some time to come, owing to the heavy expenditure that was being incurred.

SHIPLEY GAS-WORKS PURCHASE QUESTION.

The Provisional Agreement—Bill to be Promoted.

At the Meeting of the Shipley District Council last Tuesday, the Finance Committee presented minutes which contained the recommendation that "a Bill be promoted in Parliament in the ensuing session, asking for powers to acquire the undertaking of the Shipley Gaslight Company, for borrowing powers, and for other purposes."

Mr. J. ROBERTS, in moving the adoption of the minutes, explained the steps which had led up to the provisional purchase of the gas-works. He said the question had been considered several times by the members of the old Local Board and the present Council. In May last the matter was discussed, and a Sub-Committee was appointed. The Sub-Committee had several interviews with the Directors of the Company, who received the representatives of the Council in a businesslike and courteous manner. Eventually, the terms of purchase were arranged. The price was to be £228,000; being on the basis of thirty years' purchase of the profits. In addition, the Council would have to pay the Company £3904, the amount to the credit of the reserve fund, and £559, the amount standing to the credit of the profit and loss account at June 30, 1899. The Council would also have to pay the costs incidental to the agreement, £105 to the Solicitors for their costs, and one-half the cost of the winding-up of the Company, providing the sum did not exceed £250. The Company were to be entitled to pay the same salaries to their officers, and the same fees to the Directors, up to the completion of the purchase, which was to be effected as soon after June 30, 1901, as possible. The Secretary of the Company (Mr. J. W. Wilcock) and two clerks were to be retained in their offices at present salaries, or to be compensated for loss of office or income. With regard to the price to be paid, Mr. Roberts held that it compared favourably with other similar purchases in recent times. The Ilkley Council paid at the rate of 31 years' purchase, the Morley Corporation at the rate of 32½ years, the Bradford Corporation bought the North Bierley works at the rate of 31 years, and the More-

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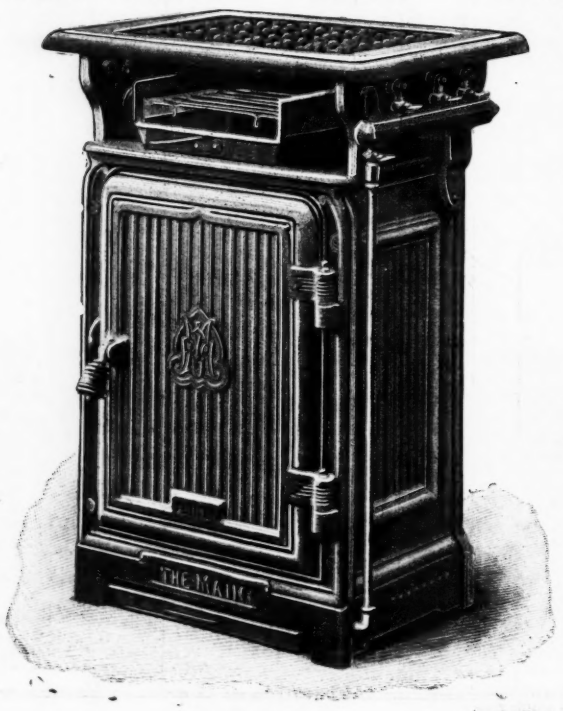

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cambe works had, it was said, been sold at the rate of 31½ years. Probably none of these Companies was in as strong a position as the Shipley Company. Replying to suggestions that it was strange to be buying gas-works and commencing electricity works at the same time, Mr. Roberts said that experience proved that, where electricity works had been started, the production of gas was not decreased. They had to provide for electric traction on the tramways from Bradford; and he thought they would probably have to extend them towards Bingley, and perhaps Baildon or Charlestown. The Council would no doubt give more facilities for the use of gas for cooking purposes than had hitherto been the case. This had been done in other districts with excellent results. He was not sanguine of being able to reduce the rates from the profits on the gas undertaking. Indeed, he did not think it would be desirable. It would be better to sell the gas at something like cost price.

Mr. A. W. Stevens seconded the motion, which was adopted.

ELECTRIC LIGHTING NOTES.

A notification by a Syndicate to the Goole District Council, that they intend applying for an Electric Lighting Order to supply the town, has moved the Authority to take steps to secure powers themselves. They already own the gas and water undertakings; and they do not view favourably the advent of a stranger in their territory.

The Ripon City Council last Thursday considered a recommendation that they should apply for a Provisional Order under the Electric Lighting Acts for the supply of electricity in Ripon, and that Messrs. G. Harrison and Co. be appointed Consulting Engineers. The Mayor (Mr. R. Wilkinson) stated that they been forced into this action through the steps taken by the North British Electricity Supply Company, who now wrote stating that, in technical undertakings such as that, it was better that a company should have control in the early stages; the local authority having an opportunity to purchase when a fair degree of success had been obtained—the price being fixed by an independent arbitrator. The Mayor said the Corporation were bound to protect their rights; and the Council endorsed the recommendation of the Committee.

The analysis of the accounts of the Halifax electricity works for the past financial year shows that, on a revenue of £16,069, there was a gross profit of £9001; and after payment of all charges, including interest and sinking fund, there was a surplus of £5489. Of this sum, £3489 was carried to a renewal account, and £2000 to the credit of the rates. The surplus in the previous year was £1862; so that there is an increase of £3627. The present charge is 5d. per unit for lighting and 2½d. for other purposes, subject to discounts varying from 5 to 15 per cent. But the tramways are only charged 2d. per unit, and for public lighting the charge is 3d. The effect is to slightly favour the ratepayer who does not use electricity. The tramway supply brought in a revenue of £7459; public lighting, £1027; and the private supply, £7333.

The Yeadon District Council have made known the result of the *plébiscite* taken on the electric lighting question. In the compulsory area, 890 papers were distributed. Only 510 were returned to the collectors, and of this number 337 were blank; while of the remaining 173, 98 were in favour of the adoption of the electric light, and 75 against. At the meeting of the District Council, when this result was made known, the Chairman proposed that the Council recommend that the Provisional Order be transferred to a syndicate, provided reasonable terms could be arranged. This was seconded; but on being put to the meeting, only the mover and seconder voted for it. As there were also two against it, the Chairman declined to give a casting vote. The question is therefore at a deadlock, which is a sorry result after the immense amount of time the Council have given to the matter.

We have had occasion recently to call attention to the troubles of the Hanley Electric Lighting Department; and each time we have had to do so, the situation seems more serious than before. A very grave state of affairs was revealed by Alderman Hammersley at the meeting of the Council last Tuesday. In moving that application be made for sanction to borrow a further sum of £7000 to meet the needs of the town in regard to electricity, he mentioned that from January to July they had generated at the electricity works 473,000 units, and the output—that was, what their customers had been charged for—was 311,000 units only. They were exceedingly anxious to find out where the leakage could be; and in their estimates they were trying to prevent leakage. It was possible there might be some at the markets, the Victoria Hall, and other public buildings. In connection with domestic lighting, it was found that the consumption in many cases had been so small that *the meters would not register it*. This was a thing the Committee hoped to remedy. And no doubt the ratepayers hope with equal sincerity that they will be able to do so.

When political matters are not to the fore in Dublin, electric lighting questions (as our columns have testified) occasionally come in to relieve the monotony. This has been the case just recently; and it came about in this way. The Local Government Board have given the Corporation sanction to borrow £254,500 for the purpose of extending the electric lighting system, on lines laid down by Mr. Robert Hammond. In the natural order of things, they advertised for, and secured, tenders for parts of the work, amounting to roughly £46,000. Then, at the eleventh hour, the Tramways Company stepped in with a proposal to take over the "assets, liabilities, and obligations" of the department on certain terms. This was followed by a long discussion in the Press; and, finally, the whole matter was submitted to the City Council yesterday week. The great interest taken in the matter is shown by the fact that one paper (we have not seen others) devoted no less than half-a-dozen columns to the debate. The Lord Mayor (Alderman J. Cummins) put the whole question before his colleagues in a very exhaustive speech; but space will not permit us to enter into the matter here at the length we should have to do to place his Lordship's arguments fairly before our readers. Suffice it to say that he regarded the Corporation scheme as worthy of acceptance; and he moved the adoption of the Committee's report. Amendments were put forward, but they were cast out by 38 votes to 14; and the original motion was adopted by a similar vote.

The Sheffield Corporation electric supply station has become inadequate

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to meet the constantly increasing demands of the public; and the Electric Lighting Committee and the General Manager (Mr. S. E. Fedden) have been considering the question of extended equipment. It will be remembered that last year Mr. Fedden's predecessor and Mr. Robert Hammond submitted exhaustive reports to the Committee on the question; and now Mr. Fedden has given his views. We find that to a large extent he is in accord with Mr. Hammond, whose conclusions were these: "(1) That in view of the present large capital expenditure, and the amount of interest and sinking fund payable thereon annually, it would be unwise to make any complete change in the system of supply. (2) That on the whole that system can be relied upon to give an efficient and economical service. (3) That the direction in which future economies can be effected is in the cessation of expenditure on further alternating plant, and the feeding of the central district by low-pressure continuous current. (4) That in all extensions of the low-pressure distributing system, whether alternating or continuous, the three-wire system should be adopted. (5) That it would be an advantage to the undertaking to obtain powers to supply any fairly contiguous districts lying outside the borough, where a good demand for electrical energy could be relied upon." With only suggestion No. 3 does Mr. Fedden disagree; he being convinced that the economies in view can be better effected by other means. He concludes that the development of the undertaking, as far as the principle is concerned, must be on the lines of extending the system already in existence. To make the system more suitable for motive power, he recommends the reduction of the "periodicities" from 100 to 50. To enable the alteration to be carried out, Mr. Fedden says it will be necessary to order two sets of plant (alternating 50 period), say each of 1000 kilowatts, to be delivered, if possible, before March, 1901; and, when these are installed, to gradually transform the present plant set by set. The cost of altering the existing system to 50 periods will be about £9400 (including alternators, motors, meters, and arc lamps). To carry out these recommendations, he estimates the following further expenditure for the year 1901: Additions and alterations in boiler-house, £3500; 200 kilowatts of new plant complete, £22,000; additional feeders, £5000; and contingencies (say) 5 per cent., £1995—making a total of £41,895. If carried out, this scheme will completely fill up the existing space; and Mr. Fedden recommends that a new and larger station should be steadily proceeded with without delay. Upon this, he proposes to present a full report at an early date. The report is to be referred to Mr. Hammond; and meanwhile a deputation of the Committee are going to the Paris Exhibition and to Frankfort to make "inquiries and examinations" as to what is best and newest in the way of electrical machinery.

A Town Without Water.—Owing to a breakdown in the pumping machinery at the water-works, the town of St. Ives (Hunts) has been without water for more than a week. The townspeople, who have no access to private wells, have been compelled to obtain water from the River Ouse.

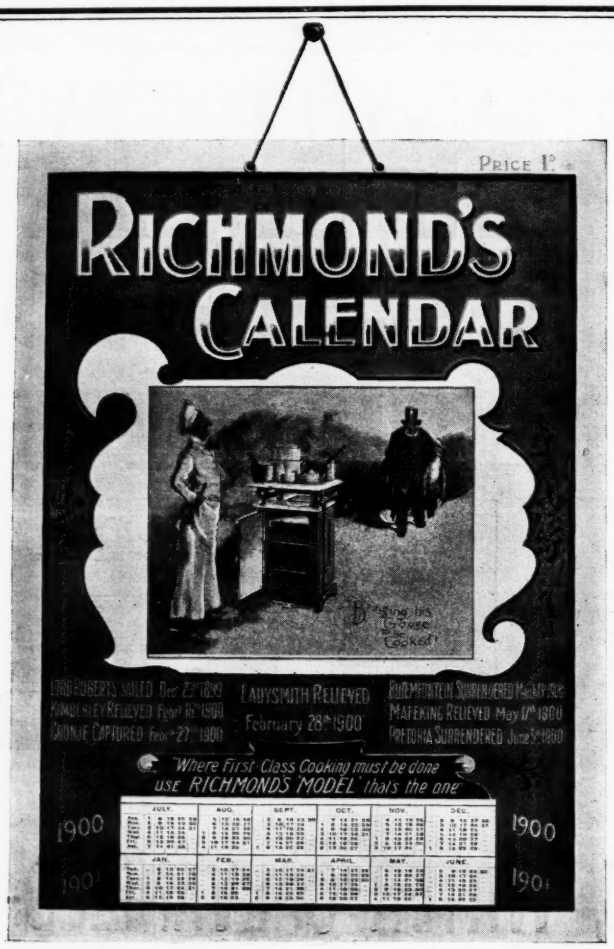
NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Greenock Gas Trust on Tuesday of this week discussed the subject of the gas managership. The Gas Committee recommended that a manager be advertised for. Upon this, it is said, there was a good deal of discussion; the question being whether they should have a manager only, or a manager who would be engineer as well. They have had experience—a satisfactory experience—of an engineer and manager; yet the Trust resolved, by twelve votes to eight, to have a manager only. This decision, I suspect, was influenced by the question of salary, which the Trust then proceeded to consider. The process of fixing the remuneration of the manager to be appointed they reduced to almost a fine art. Provost Black moved that it be £400 a year, with free house, coal, and gas; Mr. M'Innes moved that it be £400, without free house; Bailie M'Millan moved that it be £400, with a free house, but without coal, gas, or taxes; Mr. Nicolson moved that it be £300, with free house, &c.; and Provost Black homologated Bailie M'Millan's motion. The Trust then proceeded to vote upon the various proposals; and, by a process of exhaustion, the motion of Bailie M'Millan became the finding of the meeting, by twelve votes to nine. The Trust thus stand committed to the policy of having a man to conduct the gas-works, and, whenever any new works or extensions are necessary, the employment of a consulting engineer—in fact, the decision of this week almost involves the appointment of a permanent consulting engineer. Unless that be so, the Trust must be held to have adopted the course of appointing a manager with the intention of getting engineering work out of him. I daresay this is not an uncommon situation; and while we can understand a rising man undertaking such employment, it is not to the credit of a wealthy body like the Greenock Gas Trust that they should put their Manager into such a position. Stated in plain language, the resolution of the Trust is that they propose to take services which they are not prepared to pay for. I do not think, however, that they intended to do that; for I believe they rather stumbled to the conclusion they did, than arrived at it with intelligent deliberation. They have Mr. Samuel Stewart, who will be available to them as Consulting Engineer at any time they wish his services. But Mr. Stewart will require to be paid for anything he may do; and I cannot help entertaining the idea that the Trustees, in fixing the salary they are to offer for a manager alone, have forgotten that that will be a very considerable item of outlay year by year.

Mr. Forbes Waddell, of Forfar, has been appointed Manager of the Broughty Ferry Corporation Gas Undertaking, in succession to his brother, Mr. A. Waddell, who has been transferred to Dunfermline. The Gas Commissioners met on Tuesday night and made the appointment. Voting in the usual way, the short leet of five were reduced to two—Mr. Lighbody, of Renfrew, and Mr. Waddell. The final vote was: Waddell, 9; Lighbody, 3. The appointment was then made a unanimous one. It is a promotion for Mr. Waddell from a 32 to a 44 million cubic feet annual



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output; but in money the promotion is more pronounced, being from £150 to £200, with free house, coal, gas, and taxes. It was, therefore, worth his acceptance. Mr. Forbes Waddell learned the business of gas making at Dawsholm, Glasgow; and has held the appointment of Gas Manager at Tain, Blairgowrie, and Forfar. In all the places he has, by engineering skill, been able to greatly reduce the price of gas. In Forfar, where he has been since 1894, the reduction has been from 4s. 6d. to 3s. 9d. per 1000 cubic feet. He found the whole undertaking in a most unsatisfactory condition, both materially and financially. He has remained in Forfar long enough to see the material condition of the works improved and modernized so as to make them a capable instrument in the hands of a skilled man, though still far from being perfect works, and in a position to establish the undertaking on a sound financial basis. It has been uphill work; but he has faced the opposition bravely, and lived down the critical suspicions of some of his Commissioners. The gas-works have been largely transformed—a new retort-bench and new purifiers having been erected; but more important than all, in the matter of working, has been the erection of a new gasholder of large capacity. These works have been accomplished without adding much to the capital of the undertaking, which is the best tribute that can be adduced to the good management of Mr. Waddell.

Though Mr. Waddell was scarcely ever out of trouble with his Commissioners—which was due to causes for which he was not responsible—he made many friends in Forfar. At a meeting of the Corporation on Wednesday, Mr. Waddell's resignation was intimated. Provost M'Dougall said he rose with mingled feelings in connection with the resignation, because, in Mr. Waddell he was losing a personal friend, and the Corporation were losing a very trustworthy servant. He would have liked if they could to have had Mr. Waddell's services during the coming winter. They had entered upon a year's working with very high-priced coal and other materials, and they were to supply gas at last year's prices. But he did not in the least doubt that, with the knowledge their Convener had of the business, and the position the works were now in, they would be able to tide over the winter. He was pleased that Mr. Waddell had got into a better position than they were able to offer him; and they were all glad that he had obtained the appointment. He moved that the resignation be accepted. This was agreed to. The Commissioners then met in private, and resolved that the salary of the manager to be appointed should be, as at present, £150 a year, with free house, coal, gas, and taxes. In his new situation, Mr. Waddell will have less arduous duties to perform, and will work under more harmonious conditions.

In the Police accounts for the City of Edinburgh for the year ending the 15th of May last, I observe that the charges for public lighting were—for gas £9006, for electricity £10,386, and for maintenance of electric lamps £2373. Thus, for the first time, the charge for electricity exceeds that for gas, and this by a considerable amount, although only a small area of the city is as yet lighted by electricity. The Corporation give a very poor light in the streets which are lighted by gas; but when the electrician gets his hand in, they become lavish. The total charge for public lighting is over £21,000. A dozen years ago it was £14,000.

Gas is largely used in the lighting of the estuary of the Clyde. The works for the manufacture of the gas are in Port-Glasgow; and there are numerous buoy and stationary lights in the Firth. The annual inspection took place this week of the works and the lights, all of which were found to be in good condition.

The Aberdeen Corporation electric light accounts for the past year show that the total revenue was £14,211, and the expenditure amounted to £6062; leaving a balance of £8149 to be carried to net revenue account. From this, £2343 was paid as interest on mortgages and other loans, £2438 has been set aside for depreciation, £1336 has been placed to sinking fund, and £2487 of the balance is carried to the reserve fund, which now stands at £2609. The general balance fund amounts to £100,727. During the year 1,005,505 Board of Trade units of electricity were generated and sold, as against 279,950 in 1899, which was for seven months only. There are 76 public arc and 80 incandescent lamps. The amount of capital authorized to be borrowed is £82,000; and this has been exercised on mortgage to the extent of £81,953.

The accounts for the past year of the Aberdeen Corporation Water Department show that the revenue was £28,064, and that the expenditure included £8844 for maintenance of works and £5912 for interest. The sinking fund absorbed £9149, and £2000 was set aside for the renewal of the aqueduct.

During the last eighteen months, considerable alterations have been effected at the Perth Corporation Water-Works. The building has been greatly enlarged, and entirely new and modernized plant has taken the place of machinery now no longer sufficient to meet the demands of the city. So inadequate was the old plant that the Water Manager, Mr. A. Davidson, felt it absolutely necessary that more up-to-date machinery should be introduced, as under the old state of things they never knew when a breakdown might occur; and had such a calamity happened, the water supply of the whole city would have been seriously affected. With the introduction of the new plant, such a disaster is completely averted, as the new triple-expansion engine is capable of doing the work of the old four-beam engines, with 25 per cent. added. By its use great economy will be gained, as little more than half the amount of fuel is required. Its working capacity is 200 gallons per minute at high level, 868 gallons per minute at mid level, and 810 gallons per minute at low level. It is of the direct acting, inverted, surface condensing type; and can maintain the delivery of the above-mentioned capacities of water for 18 hours. At the inaugural ceremony of the new plant, Lord Provost Macgregor said that Perth was very well off with its water supply in these days. Not so long ago it was most defective. In the adjoining room was the tank or reservoir which did duty in their fathers' days in supplying the city. New engines had to be added; and they had in turn provided the Wellshill, Athol Bank, and Burghmuir reservoirs. At present, a large reservoir was in course of construction at Muirhall to supply Scone and the higher parts of Kinnoull. They had in the rich treasures of the everlasting hills, and the great floods which lay between, an inexhaustible storehouse of the precious fluid of life. For the very satisfactory condition of their water-works they were largely indebted to the Manager, Mr. Davidson. He had proved to be one of the most competent Water Managers that ever Perth possessed.

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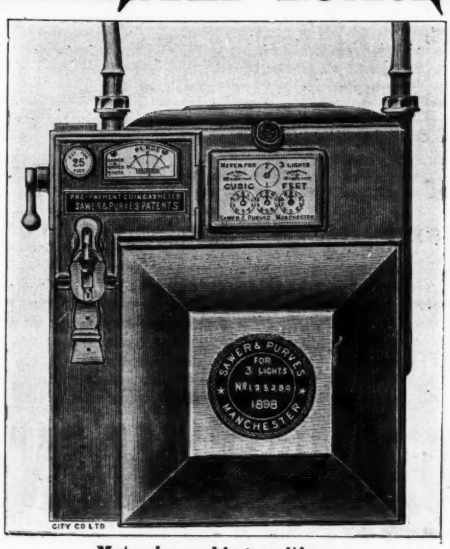
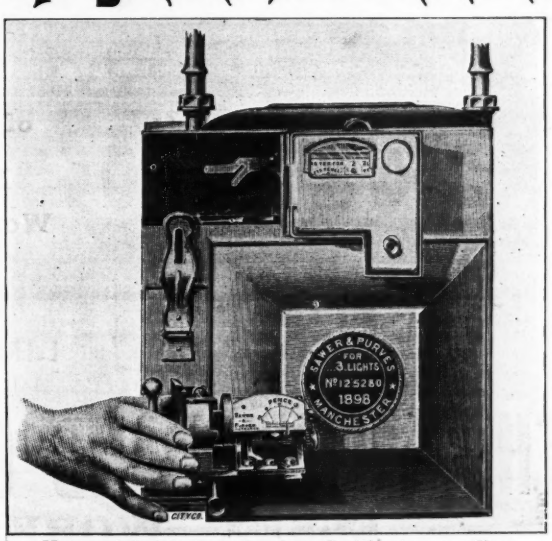


Meter in working position.



Meter with attachment removed without uncoupling.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Sept.* 1.

Sulphate of Ammonia.—There is, so far, no recovery from the depression experienced during the past month; the tendency of prices being still in buyers' favour, and the closing quotations being £10 15s. to £10 17s. 6d. per ton, delivered f.o.b. at the ports. Shipments continue on a fairly satisfactory scale; but the business was done some time since, and consumers are postponing further purchasing as far as possible. On the other hand, the larger makes were mostly sold in advance; so that the quantity offering has been small and chiefly absorbed for covering sales for August delivery. In the forward position, there has been considerable inquiry; but the firmness of makers still stands in the way of business—£11 5s. per ton for October-March, and about £11 2s. 6d. for October-December delivery being required f.o.b. Leith. There has, however, been some speculative selling abroad, at below the equivalent of these prices.

Nitrate of Soda is firm at 8s. 1½d. to 8s. 4½d. per cwt., according to quality, on spot.

LONDON, *Sept.* 1.

Tar Products.—Benzols continue fairly steady; but there is not the same keenness at the moment to purchase. This is largely due to the higher price being asked by makers. Pitch is firm, and shipments are recommencing; but the higher freights now quoted for this article seriously affect it, and fuel makers bitterly complain that with high prices for small coal and pitch there is little or no profit. Carbolic acid is better, with a strong inquiry for forward delivery. Cresylic acid is also participating in the higher values. Anthracene continues about the same; but there is not much business being done. Makers are accepting rather low prices for creosote and tar oils, doubtless with a view to getting their store-tanks cleared out before the season of large production. Solvent naphtha is slightly firmer; but other naphthas are weak.

The average values during the week are as follows: Tar, 17s. to 25s. 6d. Pitch, east coast, 37s. 6d.; west coast, 32s. 6d. Benzols, 90's, 9½d.; special qualities for gas, 10½d.; 50's, 11d. Toluol, 1s. 3d. Solvent naphtha, 1s. 3d. Creosote, 2d. Heavy oils, 3d. Carbolic acid, 50's, 2s. 4d.; 60's, 2s. 10d. Naphthalene, 75s.; salts, 50s. Anthracene, "A," 4d.; "B," 3d.

Sulphate of Ammonia.—The market has been extremely erratic this week, but is now steadying down at about £10 15s. per ton, less 3½ per cent. at all ports.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The most noticeable feature during the past week in the coal trade of this district has been an extra pressure of orders coming forward for shipment, as a result of the South Wales railway dispute, which, for the time being, has forced up prices to special figures for prompt cargoes—as much as 22s. 6d. to 23s. per ton having been got in exceptionally urgent cases, while 18s. to 20s. has been a very general quotation for steam coals, delivered at ports on the Mersey. With the settlement of the railway dispute, however, prices will no doubt speedily get back to something like their normal level; and with regard to other sections of the coal trade, the position has undergone no very material alteration. The better qualities of round coal have perhaps not been in quite such pressing request for house-fire purposes; and collieries are beginning to get straighter with the arrears of deliveries on their books. But there is still an absence of anything going into stock; and the demand continues in excess of what is usual at this time of the year. The result is that prices remain exceedingly firm at the full list basis; best Wigan Arley being quoted at 16s. 6d. to 17s. per ton at the pit, Pemberton four-feet and seconds Arley 15s. to 15s. 6d., and common house coal 14s. to 14s. 6d. The lower qualities of round coal have necessarily been drawn upon largely for shipping purposes, wherever collieries have been able to avail themselves of the exceptional prices that have been obtainable at the ports; but the home demand, although generally active, is not quite so brisk as it has been for iron-making, steam, and general manufacturing purposes. For the present, however, prices continue exceedingly strong, with 12s. 6d. to 13s. per ton the minimum quotations for steam and forge coals at the pit. The pressure for shipment has also had some effect on engine classes of fuel, as a good deal of through-and-through coal has been sent away to the ports, thus taking off a fairly large quantity of slack; and, consequently, surplus supplies have not been quite so plentiful on the market. The holidays, which have largely affected the requirements for engine fuel in the manufacturing districts, are now approaching a close; and this will also have some influence upon the slack market. Lancashire collieries still hold firmly to their basis rates of 10s. 6d. to 11s. per ton at the pit, according to quality, for slack; and they seem to anticipate some improvement in the market before very long. But cheaper supplies are still obtainable from some other districts. Lancashire coke makers are holding pretty well to late rates; but furnace cokes coming in from Yorkshire continue to ease down, and during the past week contracts in this immediate district have been placed at as low as 20s. per ton at the ovens.

Northern Coal Trade.—The coal trade of the North has been made irregular and excited by the effect of the stoppage in Wales, and by the many rumours as to its duration. Coal, and especially steam coal, has been forced up to high prices; but it needs to be borne in mind that only small quantities are sold at any such rates, and that the great bulk of the coal is delivered on contracts that are uninfluenced by the stoppages, and are at comparatively low prices. Bearing this in mind, it may be said that best Northumbrian steam coals have been sold at 24s. to 25s. per ton f.o.b.—a very sharp advance. For steam smalls, the price is from 12s. 6d. to 13s. per ton. The household coal trade is unchanged. In gas coals, there have been higher quotations in sympathy with the price of other coals, and 18s. to 19s. per ton f.o.b. has been frequently named; but the sales at such rates are very doubtful, and the quotation may be considered a nominal one. The gas coal collieries seem to be working better, and the output is well taken up; the deliveries to the

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large companies increasing with the incoming of September. There is some speculation as to the next contracts for the South Metropolitan Gas Company; but, as far as we can learn, it is entirely premature. Coke is very steady, and best quality for export is from 32s. to 34s. per ton f.o.b., while blast-furnace coke is about 28s. free at the furnaces. These prices, of course, have their influence on those for gas coke; but there is no variation this week in the latter. There is an increase in the output; but it is readily taken up, and the stocks are generally small. As to fuel of all kinds, it must be expected that the settlement in Wales will make coal cheaper, and in a day or two lower prices will become general; but now irregularity and weaker rates are the chief features.

Scotch Coal Trade.—The coal trade is in an excited condition; the tendency being to still higher prices. There is no slackening of the demand, which, both for home and foreign consumption, is quite abnormal. The quotations may be given as: Main 16s. 6d. to 17s. per ton f.o.b. Glasgow, ell 17s. 6d. to 18s. 6d., and splint 17s. to 17s. 6d. The shipments for the week amounted to 250,168 tons—an increase of 6677 tons upon the previous week, and of 49,633 tons upon the corresponding week of last year. For the year to date, the total shipments have been 6,915,485 tons—an increase upon the corresponding period of last year of 1,232,769 tons.

Advances in Bradford Gas Workers' Wages.—At a meeting of the Gas Committee of the Bradford Corporation last Friday, Alderman Aykroyd presiding, the applications for increased wages made by various grades of the workmen were considered. It was decided to grant the following advances, which are equivalent to about £1600 per annum: Stokers, from 5s. to 5s. 2d. per shift of eight hours; purifier men, 6d. to 6¼d. per hour; yardmen, 5¼d. to 5¾d. per hour; and foreman stokers, 40s. to 42s. per week. The men engaged in laying gas-mains are to be granted advances in their pay per hour as follows: Men at 22s. per week to have 5¾d.; at 23s. per week, 6d.; at 24s. per week, 6¼d.; and at 25s. per week, 6½d.

Mr. Livesey on the Growth of the Slot-Meter Business in South London.—The Assessment Committee of the Wandsworth Union have been asked to reduce the assessment of the works belonging to the South Metropolitan Gas Company in Battersea, Clapham, and Streatham from £25,000 to £15,200, on the ground that the profits last year were £2000 less than those realized in 1894, and that they were, in fact, only just sufficient to pay the dividends. The Committee do not seem disposed to make the concession; but a conference is to take place between them and the Company's representatives, with a view to a compromise. In the course of an interview which Mr. Livesey had with the Committee last Tuesday, he offered a few observations on the remarkable growth of the slot-meter business. He pointed out that it had taken the Company 80 years to get 100,000 ordinary gas consumers, while it had only taken them eight years to get an equal number of working-class penny-in-the-slot meter customers. These slot meters were being supplied at the rate of 300 per week, and the fittings of each cost about £6. They were now fixing meters and fittings in lodgers' rooms in houses.

Local Authorities as Colliery Owners.—Mr. N. W. Hubbard, the Chairman of the Asylums Committee of the London County Council, has put forward a suggestion that the Council should seriously consider the advisability of securing a municipal coal mine, by purchase, renting, or on royalty. Curiously enough, Mr. Hubbard is a coal merchant, and his suggestion has been made in consequence of a proposal that the Council should secure a wharf and do their own distributing. At a meeting of the Gas Committee of the Manchester Corporation last Friday, a member gave notice that he would bring forward at the next meeting the question of buying and working a mine to supply the Corporation gas-works with coal. The Committee, it is interesting to note, have received an offer of coal from America; and although they are unable to accept it, owing to the present contracts, it is intended to make inquiries with a view to comparing prices.

Dorking District Councils and the Water-Works.—At the meeting of the Dorking Urban District Council last Thursday, the Chairman (Mr. J. W. Palmer, J.P.) called the attention of the members to the fact that he had placed upon the *agenda* a notice of his intention to move—"That the necessary steps be taken for carrying into effect the powers conferred on the Council for acquiring the undertaking of the Dorking Water Company." He quite understood that he had nothing to do but to submit the resolution; but he had since been informed that this was not the case. Certain legal difficulties presented themselves; and it would be necessary for him, or some other member of the Council, to give formal notice, and that such notice be given at least 10 clear days before the motion was adopted, after which the resolution had to be advertised in the local papers. Under the powers conferred upon the Council and the Rural District Council by the Dorking Water Company's Act of the past session, they had the option of applying to Parliament either during the ensuing session or in that of 1902. He thought they would agree with him that if any action was to be taken it should be commenced at once. It was not fair to the Company that the matter should hang up for an indefinite period; and he therefore gave notice of his intention to move at the next meeting—"That, in the opinion of this Council, it is desirable to apply for powers to take over the Dorking Water Company's undertaking at the earliest possible moment; and that the Clerk be directed to take such steps as may be necessary for promoting a Bill in the next session of Parliament, either in conjuction with the Rural District Council, or, in case the Rural District Council is not willing to co-operate, then on behalf of this Council alone, for the purpose of taking over the undertaking of the Dorking Water Company, pursuant to powers conferred upon this Council and the Rural District Council by section 26 of the Dorking Water Company's Act of 1900." A meeting of the Joint Committee, consisting of three members of the Council, and three of the Rural District Council, had been held that morning, when, after some discussion, it was unanimously resolved—"That, in the opinion of this Committee, it is desirable that a Bill should be promoted in the next session of Parliament for taking over the undertaking of the Dorking Water Company under the powers conferred on the respective Councils by section 26 of the Dorking Water Company's Act of 1900." These are decided indications of a wish to purchase.

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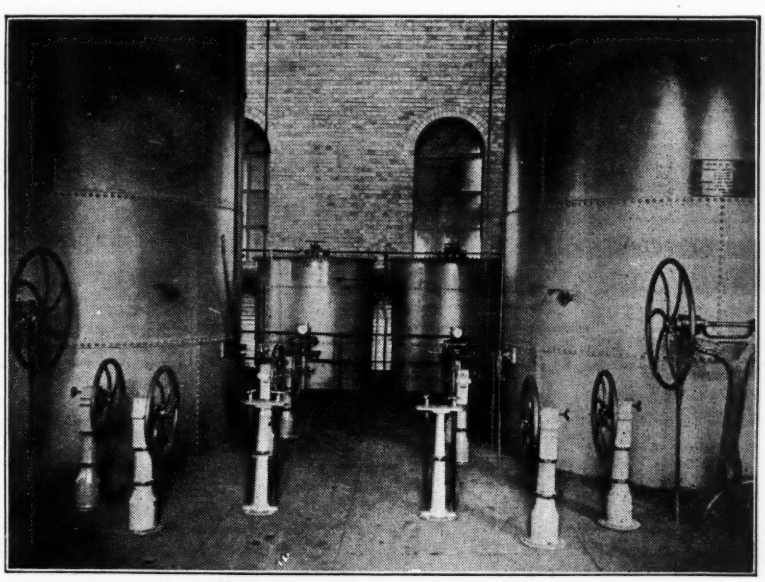

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The Maximum Daily Capacity of the Birmingham Corporation's Plant, which was erected by this Company, is 10 MILLION CUBIC FEET.

The Labour Trouble at the Doncaster Gas-Works.—We learn that the dispute which led the stokers at the Doncaster Gas-Works to hand in their notices, as mentioned in the "JOURNAL" last week, has been settled on terms which are favourable to the men.

New Holder for the Reigate Gas Company.—Messrs. Westwood and Wrights are erecting a holder for the Reigate Gas Company to the designs and under the superintendence of Mr. F. S. Cripps. It is telescopic, of 200,000 cubic feet capacity. The guide-framing consists of light well-braced framework, which, owing to the disposition of the material in proportion to the strains, is very strong. All the wearing parts of the holder are extra strong and durable.

Scheme of Water Supply for the Easingwold District.—Last Thursday, an inquiry was held at the Town Hall, Easingwold, by Mr. W. A. Ducat, an Inspector of the Local Government Board, in regard to an application by the Rural District Council of Easingwold for power to borrow £16,000 to supply eleven villages with water—Carlton Husthwaite, Husthwaite, Raskelf, Tholthorpe, Flawith, Alne, Youlton, Aldwark, Tollerton, Huby, and Sutton-on-the-Forest. The supply is to be obtained from springs near the Hambleton Hills; and the scheme has been projected on account of a report made by Dr. Barry, one of the Local Government Board Inspectors, a few years ago, which commented very adversely on the water supply of these villages. It was stated that the water would be taken from Cragg Hall and Roulston Scarr springs, near Kilburn, and there was an abundant supply. Pipes will have to be laid for 28 miles to serve the villages. At the conclusion of the inquiry, which lasted three hours, the Inspector and others went to the Hambleton Hills to see the springs.

"Borrowing" Money from a Prepayment Meter.—At the Strangeways Police Court, Manchester, last Thursday, a married woman named Catherine Pryer, living at 145, Stockport Road, Levenshulme, was charged with having extracted 6s. 2d. from a penny-in-the-slot meter. Police-Sergeant Gill was informed of the matter, and arrested the prisoner. Mr. J. K. Gardener, a meter inspector of the Corporation, stated that at 1, Egerton Road, Levenshulme, there was a meter, which he found had been opened, and had only 1s. 3d. in it. The gas registered showed that 7s. 5d. should have been in the box. The house was empty at the time. Mrs. Broady stated that the prisoner gave her 5s. 5d. to put back in the meter. Sergeant Gill stated that the prisoner, when charged, said she had not taken 6s. 2d., but only 5s. 5d., and she had been told that the inspector would take the money from her and say nothing. Mrs. Broady had a key which would unlock the meter, and the accused asked her to lend it to her. She took out 3s. 8d. one time and 1s. 8d. the next, intending to put it back. The Magistrate said that was not stealing money. Mr. Gradwell said he had investigated the case, and found that the prisoner had removed. He traced them, and when he spoke to them about the money, they all began to charge one another with the theft. They were not allowed to interfere with the meter in any way. His Worship remarked that that was an offence against the Gas Acts, and not theft. The woman was released on her own recognizances, and protested that she did not intend to steal the money.

Sales of Shares.—At a sale by Messrs. Hollis and Webb at Leeds last Tuesday, some old shares of the York Water Company realized £28 each, *ex div.* On Thursday, Mr. Walter Cox disposed of two parcels of £50 and £25 of consolidated stock of the Maidstone Gas Company at £101, £100, and £51 respectively.

The Costs of the Derwent Valley Water Act.—At a meeting of the Derwent Valley Water Board, held at Leicester last Thursday, the following costs, as allowed by the Taxing Master of the House of Commons, were presented to the Board and ordered to be paid: The Corporation of Sheffield, £25,223 16s. 7d. and £804 3s. 1d.; Derby, £1804 3s. 1d.; Leicester, £1804 3s. 2d.; Nottingham, £1304 3s. 1d.

The Suggested Coal Inquiry.—The "Iron and Coal Trades Review" says a great deal of disappointment has been expressed in some quarters at the failure of the Government to appoint a Royal Commission to inquire into the whole question of the present scarcity and cost of fuel in relation to exports, domestic consumption, and other collateral issues. Our contemporary adds: "There is a growing feeling up and down the country that such a Commission is wanted, and that we shall not fathom the true causes and prospects of the present situation until it has been closely investigated by such a body of experts. But for the moment the matter appears to be shelved, although the high price of coal is a problem that demands the most searching inquiry in regard alike to the prospect of its permanence and its influence on the trade and commerce of the country."

The Proposed Gas-Works Extensions at Carlisle.—At the last meeting of the Carlisle Town Council, the question of the extension of the coal-gas plant was referred back to the Gas Committee for further consideration, with instructions to call in Mr. Corbet Woodall to advise upon the best means of augmenting the gas supply, either by the introduction of carburetted water-gas plant or the extension of the present system. Since the meeting the Committee have had an interview with Mr. Woodall, who advised them verbally as to the course to be pursued; and it was agreed that, before taking action, he should submit a report in writing setting forth his suggestions. We learn that Mr. Woodall indicated that, in his opinion, there was too little room on the Viaduct site for such an extension of the coal-gas plant as is desirable, but that it would be possible to introduce plant to produce (say) 600,000 cubic feet of carburetted water-gas daily. If the views of the Committee were in favour of an extension of the coal-gas plant, he would advise the Council to leave the Viaduct and go to Boustead's Grassing, or even farther away from the city if possible, and put up their works there. A local paper says that, judging from the feeling of the Committee, it is very likely, if an extension of the coal-gas plant should be decided upon, Boustead's Grassing, which belongs to the Corporation, and on which there are already works, railway sidings, &c., would be made the site of the gas-works of the future. The introduction of carburetted water-gas plant to the extent above mentioned would stave off the day of the removal of the gas-works from their present site; but, having regard to the increased consumption and to its probable further increase, this removal seems to be a contingency which may be looked upon as inevitable.

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Telegraphic Addresses: "FORTRESS, DONNINGTON, SALOP." "FORTRESS, LONDON."
Codes used A.B.C. and "A1."
Telephone No. 12, WELLINGTON, SALOP.

GASHOLDERS WITH OR WITHOUT STEEL STANDARDS AND TANKS.

PURIFIERS IN CAST IRON OR STEEL.

PURIFYING-MACHINES FOR AMMONIA. SCRUBBERS.
TAR-EXTRACTORS. RETORT MOUTHPIECES OF ANY SHAPE.

WECK'S PATENT CENTRE-VALVES.

CONDENSERS. **CRIPPS'S GRID-VALVE** TAR-BURNERS.

SIEVES. For bye-passing the lower layer in Purifiers. VALVES.

TYSOE'S SELF-SEALING MOUTHPIECES.

Tar-Distilling Plants. Claus' Sulphur-Recovery Plants.

SULPHATE OF AMMONIA PLANTS.

Cessation of Street Lighting by Gas at Oakengates.—The Urban District Council at Oakengates have decided to dispense with gas for street lighting during the ensuing winter, and to substitute oil-lamps. The reason for the change is the advance made in the price of gas.

The Price of Gas at Totnes.—The advance of 1s. per 1000 cubic feet which the Directors of the Totnes Gas Company felt called upon to make to enable them to meet the increased cost of coal has naturally been distasteful to the consumers; and, in certain cases, threats have been held out of resisting the extra charge. With the view of meeting the difficulty, the Directors have given notice that the price to all consumers who pay their Bills as rendered by the Company for gas consumed for the quarters ending Midsummer and Michaelmas will be reduced for the quarter ending Christmas, and until further notice, from the present figure of 4s. 6d. to 4s. 3d. per 1000 cubic feet.

The New Reservoirs for the Halifax Corporation.—The ceremony of cutting the first turf of the new reservoirs to be constructed by the Halifax Corporation at Walshaw Dean, situate above Hebden Bridge, has been fixed to take place on the 17th inst. Invitations are being sent to the members of the Town Council, the Mayors of neighbouring boroughs, and the Chairmen of District Councils who take water in bulk from Halifax. The contract for the construction of the reservoirs was recently let to Mr. Enoch Tempest, of Manchester, for £170,766. They are expected to take four years to construct, and will, when completed, provide an average supply of 2½ million gallons per day.

Adoption of Profit-Sharing by Messrs. Willey and Co.—In fulfilment of a promise made some eighteen months ago to his artisans, and after several conferences with Mr. Livesey and the Board of Trade officials as to the various profit-sharing systems in vogue, Mr. Willey, of the firm of Messrs. Willey and Co., of Exeter, has issued the following notice: "Take notice, in accordance with Mr. Willey's promise, a profit-sharing scheme will be introduced and placed in operation directly the results of the present year's working is ascertained—*i.e.*, on and after Jan. 1, 1901; thus practically taking the whole of the employees into partnership. This preliminary notice is given so that every employee may feel a personal interest in the work done, the avoidance of waste of any description, and the general economy and efficiency of the place, since everyone, under certain conditions, will share in the profits hereafter." The details of the scheme will not be known until after Christmas; but it is understood to rest on these principles: A reasonable apportionment of profit as return for capital, the balance of each year's trade to be shared (subject to limitations of service) in certain fixed proportions.

New Joint-Stock Companies.—The following new joint-stock companies have lately been registered: The Improved Coke Company, Limited, with a capital of £20,000, in £1 shares, to carry on the business of mineral and metal winners, workers, and merchants, coal and iron masters, coal merchants, &c. The Phos Acetylene Gas Company, Limited, with a capital of £7500, in £1 shares, to adopt an agreement for the acquisition of certain patents, and to carry on the business of manufacturers and suppliers of acetylene gas. Westleigh Estates Company, Limited, with a capital of £96,000, in £1 shares, to acquire certain real estate situate in Westleigh and Hindley, Lancashire; to develop and extend the same; and, generally, to carry on the businesses of colliery proprietors, mine owners, coal and iron masters, coke manufacturers, and producers and suppliers of gas and electricity for the purposes of light, heat, or power, &c. Western States Oil Syndicate, Limited, with a capital of £100,000, in £1 shares, to adopt and carry into effect an agreement expressed to be made between the British, Transvaal, and General Finance Company, Limited, of the one part, and the Syndicate of the other part, for the acquisition of certain oil-bearing lands in the United States, and to develop the same; and, further, to acquire any other mines, mining, water, and other rights in any part of the world. There was registered in Edinburgh last week the undertaking of Kerr and Co. (Maryhill), Limited, which has been formed to purchase and develop the business of Kerr and Co., ironfounders, Caledonia Foundry, Maryhill, Glasgow. The capital is £30,000, divided into 15,000 6 per cent. cumulative preference shares of £1 each, and 15,000 ordinary shares of £1 each. Among the first subscribers is Mr. James M'Gilchrist, of Dumbarton, who is also one of the first Directors.

Messrs. A. C. Wells and Co. have been awarded at the Paris Exhibition silver medals for the "Wells" lights, and their "Lightning" painting-machine. They have, in addition, received "*mention honorable*" for their "Waste Oil" filters, "Unbreakable" lamps and oil-feeders, and "Industrial" lamps.

The Dublin staff of Messrs. Richmond and Co., Limited, consisting of upwards of a hundred, with a few friends, recently had a most enjoyable excursion to Wicklow, at the Company's expense. Mr. E. W. T. Richmond, the Managing-Director of the firm, presided at luncheon in the Assembly Rooms.

At a meeting last Thursday of the Joint Committee for carrying out a combined electric traction and lighting undertaking for the four boroughs of Mossley, Stalybridge, Dukinfield, and Hyde, it was decided to appoint Mr. Alfred H. Gibbings, of Bradford, to carry out the promotion of a Bill next session to sanction the undertaking.

Messrs. Geo. Bray and Co., of Leeds, have issued a new descriptive gas-burner catalogue and trade list—their new Blue Book—setting forth the whole series and sizes of gas-burners manufactured by them, for the forthcoming gas lighting season. The particulars of the burners are prefaced by some interesting facts about gas lighting.

The Lamp Manufacturing Company, Limited, have sent us one of their new illustrated catalogues, for the season 1900-1901, of railway, street, and shop lamps for gas and oil. The "Coligny" and "Fullford" regenerative gas-lamps are shown, as well as a large variety of stoves, burners, globes, shades, and other appliances. The catalogue extends to 140 large quarto pages.

The Rhondda Urban District Council have placed a repeat order with Messrs. R. Dempster and Sons, Limited, of Elland, for extensions to the carbonizing plant erected by the Company at the Ystrad and Porth Gas-Works in 1898; and, subject to the approval of the Local Government Board, have also given the Company instructions for a steel tank 111 feet in diameter and 20 feet deep, with telescopic gasholder, foundation, &c.

Our readers will see, by the report which appears elsewhere, that the Corporation of West Bromwich have decided to introduce the Dellwik-Fleischer water-gas system. The Gas Manager (Mr. T. Glover) carefully investigated some of the Continental installations of this plant last spring; and, on the strength of his report, and the advantages which can be offered, its erection was decided upon. It will be constructed by Messrs. R. & J. Dempster, of Manchester, and will have a daily capacity of 400,000 cubic feet.

Owing to a mistake in changing the washers of the new gas-producing plant at Messrs. Brunner, Mond, and Co.'s chemical works at Winnington, near Northwich, on Monday morning last week, an explosion occurred, which was followed by a serious fire. Greatly exaggerated accounts of the accident appeared in some of the papers; the loss being put at £150,000. The Directors, however, state that the machinery has not sustained much injury, and that the damage, estimated at about £10,000, is fully covered by insurance.

The following figures show the extent to which the great railway companies have been affected by the high price of coal in the past half year: Great Eastern, £30,000; Great Northern, £58,800; Great Western, £45,000; Great Central, £48,000; Lancashire and Yorkshire, £30,000; South-Western, £17,000; Metropolitan, £5380; Midland, £108,000; North Eastern, £68,000—total, £410,180. This is bad enough; but the current six months will be worse. Indeed, in the case of the Great Eastern alone the Chairman has warned the shareholders that the coal bill in this half may be £100,000 more than in the period just closed.

A large gathering of the employees of West's Gas Improvement Company, Limited, witnessed and took part in their fifth annual sports at the Belle Vue Gardens, Manchester, on Saturday, the 25th ult. All the events were very successful, and it was generally agreed that they surpassed any of the previous gatherings. At the close, tea was served, of which about three hundred partook, including the officials and employees, also one or two members of the gas profession—Mr. John West, sen., presiding. A good entertainment was afterwards provided by the employees, and the usual toasts honoured. A very happy day was concluded by witnessing the fireworks.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.

JOHN WM. O'NEILL, Managing Director, 160, 161, & 162, Palmerston Buildings, Old Broad Street, London, E.C.

Andrew Stephenson, Agent. All communications *re* Oxide to the Company as above.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for use in GAS-WORKS.

Andrew Stephenson, 182, Palmerston Buildings, Old Broad Street, London, E.C.

"Volcanism, London."

ENRICH your Gas with cheap Benzol, Specially prepared, free from sulphur. At to-day's Price of Benzol, ILLUMINATING POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.

Apply to Sadler and Co., Middlesbrough.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, Oldham; and 45 & 47, Westminster Bridge Road, London, S.E.

First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.

Telegraphic Addresses: "Braddock, Oldham." "Metrique, London."

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Limited, Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Waggons or Carboys. Highest references and all particulars supplied on application.

TO GAS AND WATER OFFICIALS.

HIGH-CLASS Cycles at reasonable and low Prices. Guaranteed for Twelve Months. Sent on approval. For Cash or Gradual Payment System. Send for Catalogue, Post Free.

Melrose Cycle Company, Coventry.

PATENTS FOR INVENTIONS.

Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.

Information and Handbook on application.

70, Chancery Lane, London, W.C.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.

BALE & CO.'S Oxide of uniform quality. SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.

120 and 121, Newgate Street, London, E.C.

Telegrams: "Bogore, London."

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.

Prices, &c., will be forwarded on application.

No. 30, St. Andrew Square, Edinburgh, } Scotland.
Newton Grange, Newbattle, Dalkeith, }

BROTHERTON & CO.

Offices: Commercial Buildings, Leeds.

Correspondence invited.

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.

Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.

Read, Holliday and Sons, Ltd., Huddersfield.

GAS TAR wanted.
BROTHERTON AND Co., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

SULPHURIC ACID for Sale.
BROTHERTON AND Co., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

NEW GAS PLANT CEMENT.
JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
For all Joints in connection with Oil Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND Co., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PRACTICAL RETORT SETTERS.
GEORGE NUTTALL & CO., 32, Havelock Road, Saltley, Birmingham.
Regenerator or other Furnaces erected to Engineers' own Designs. Best Work Guaranteed. Please write for Estimates.

FIRST-CLASS Incandescent Gas- Mantles, also all other Articles in this line, are manufactured, carried on a large scale, and exported to all parts of the World by
GESELLSCHAFT FUR GLUHLICHT-BELEUCHTUNG, DRESDEN.
Telegraphic Address: "GLUHLICHTFABRIK."

SADLER & CO., Ltd., Middlesbrough, Tar Distillers and Tar Colour Manufacturers. BENZOL specially prepared for Gas Enrichment free from Sulphur. Pure Hydrated OXIDE OF IRON for Purifying Gas either for Sale or Lent on Hire. Always Buyers of GAS TAR and AMMONIACAL LIQUOR.

PORTER & CO., Gowts Bridge Works, LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER, LINCOLN."
[For Illustrated Advertisement, see p. 608.]

GAS Accountant (Expert) is open to Contract to keep Gas-Works Accounts, prepare Balance-Sheets, and to undertake duties of Secretary. London Office for Board Meetings.
Address No. 3549, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Gas-Fitter, well up in Iron and Compo.
Apply to Mr. F. OSMOND, Gas-Works, DORCHESTER.

GASMAN wanted (non-Union; Fitter preferred) for small Private Works in Country. Wages 20s., Rent Free, and Allowances.
Apply AGENT, Haverland, NORWICH.

STOKERS wanted, used to Shovel Charging. Constant employment for good, steady Men. Wages 31s. per week.
Apply to BENJAMIN BARK, Gas-Works, GODALMING.

WANTED, immediately, a competent WORKS FITTER, used to West's Stoking Apparatus. Permanent Work with good Wages. State Age and Experience.
Apply to H. SMYTHE, Gas-Works, MAIDSTONE.

WANTED, by the Redhill Gas Company, a Competent MAIN and SERVICE LAYER.
Applications, stating Age and Experience, also Testimonials, if possible, to be sent to the Company's Engineer, D. H. HELPS, Gas-Works, REDHILL.

WANTED, a Retort-House and Yard FOREMAN (Working), at small works near London. Must be good Blacksmith and Fitter. Wages £2 per week.
Apply, with Testimonials, to No. 3551, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, at once, at a large Provincial Gas-Works, a Young Man as SUPERINTENDENT of Main and Service Laying, Public Lighting, &c. Highest references as to character and ability.
Apply, stating Wages required, to No. 3550, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WORKING Manager required, by the Gas Company, Marlow, Bucks. Annual make of Gas about 14 millions. Must be able to fix Services, read Meters, and do small Repairs to Plant. Wages about £2 per week, with House, Gas, and Coal.
Apply, stating Age, Experience, and with *copies* of two recent Testimonials (which will not be returned), to Mr. A. D. CRIPPS, Secretary of the Company, GREAT MARLOW.

GAS Manager (experienced) wanted for the Forfar Gas Corporation. Salary £150, with free House, Coals, and Gas.
Applications to be lodged with William Gordon, Solicitor, Forfar, Clerk, not later than Twelve o'clock noon on Monday, the 10th of September next.
Forfar, Aug. 30, 1900.

GAS MANAGER.
WANTED, immediately, a steady com- petent Man as WORKING MANAGER for a small Country Gas-Works. House, Gas, and Coal found.
Apply stating Age, References, and Wages required, to Mr. BEN SMITH, Secretary, Gas Company, Horbling, FALKINGHAM.

WORKS MANAGER.
THE Anti-Vibration Incandescent Lighting Company, Limited, invite applications from competent persons for the position of MANAGER, who will have entire control of the Workshop, Offices, Branches, and Travellers.
For Salary and other Particulars, apply to the Chairman, WM. SPINKS, 20, Park Row, LEEDS.

WANTED, a Gas Manager for the Gas Undertaking of the Board of Police of Greenock. Salary £400 per annum with House rent free.
Applications, with accompanying Testimonials, endorsed "Gas Manager," to be lodged with the Subscriber not later than the 10th of September.
C. MACCULLOCH,
Town Clerk.
Municipal Buildings,
Greenock, Aug. 28, 1900.

CITY OF BRADFORD.
(GAS DEPARTMENT.)
THE Gas Committee invite applications for the position of ASSISTANT GAS ENGINEER, at a Salary of £300 per annum.
Candidates must have had a thoroughly practical experience in Gas Engineering and Gas-Works Management.
Applications, endorsed "Assistant Gas Engineer," and stating Age and Qualifications, with *copies* of not more than three recent Testimonials, to be addressed to me on or before Sept. 20.
Canvassing will be considered a disqualification.
FREDERICK STEVENS,
Town Clerk.
Town Hall, Bradford,
Aug. 31, 1900.

"CUTLER'S" Condenser, ¾ million day, equal to new; weight 12 tons; accept £100 on rail, Berkshire, if sold promptly.
J. F. BLAKELEY, Thornhill, DEWSBURY.

HIGH PRICED COAL.
SMALL Gas Authorities should im- mediately adopt an EXHAUSTER, and thus make probably at least 750 cubic feet of gas more from each ton of Coal carbonized. Several small sets *in stock*, both New and Second-hand.
Address J. FIRTH BLAKELEY AND Co., Thornhill, DEWSBURY.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

SECOND-HAND PHOTOMETERS.
MESSRS. Alex. Wright & Co., Ltd., have several second-hand EVANS & LETHEBY PHOTOMETERS, complete with Instruments in thorough working order and good condition, which they can offer at greatly reduced Prices.
Write ALEX. WRIGHT AND Co., LIMITED, Precision Works, 81, Page Street, WESTMINSTER, S.W.

EXCELLENT SET OF PURIFIERS FOR SALE.
THE Yeadon and Guiseley Gas Company have FOR SALE a set of Four PURIFIERS, 14 feet square, complete with Centre-Valve, Connections, and Travelling Lift. Also a separate CATCH PURIFIER of same size, with Slide-Valves and Travelling Lift.
The whole are now in use in excellent condition, but must be removed in about a month.
Offers will be received, and further Information given, by the Manager, Mr. E. Lister.
Gas-Works, Yeadon,
Aug. 28, 1900.

J. FIRTH BLAKELEY & CO., Thornhill, Dewsbury, have FOR SALE:—
One Set of Three 6-ft. PURIFIERS.
One ,, Two 8-ft. ,,
One ,, Four 8-ft. ,,
One ,, Four 16-ft. by 12-ft. PURIFIERS.
Four 5-inch ANNULAR CONDENSERS.
Four 10-inch ,, ,,
Six 16-inch ,, ,,
"Cutler" ¾ million "WATER" CONDENSER.
Wrought-Iron TOWER SCRUBBERS, 3 ft. by 14 ft., 3 ft. 6 in. by 27 ft., and 7 ft. by 32 ft.
Cast-Iron TOWER SCRUBBERS, 3 ft. 6 in., 5 ft., and 6 ft. diameter.
EXHAUSTERS, 2000 to 60,000 Cubic Feet per hour.
"Holmes" & "Clapham" WASHER-SCRUBBERS.
"Livesey" & "Cripps" WASHERS.
4-in., 6-in., 8-in., and 10-in. STATION METERS.
Splendid GASHOLDER, 50 ft. by 20 ft.
RETORT IRONWORK, MODERN HYDRAULICS.
Telegrams: "BLAKELEY, THORNHILL LEES."

GLASGOW INTERNATIONAL EXHIBITION, 1901.

GAS LIGHTING.

THE Executive Council are prepared to receive PROPOSALS for EXHIBITS of INCANDESCENT and OTHER SYSTEMS of NOVEL GAS LIGHTING for Illuminating the Grounds and Detached Buildings of the Exhibition. For such Exhibits gas will be supplied free of charge.
Application to be made to the undersigned,
H. A. HEDLEY,
General Manager.
36, St. Vincent Place, Glasgow,
Aug. 30, 1900.

FOR SALE—A U Section of Hydraulic MAIN for a Setting of Seven Retorts, with MOUTHPIECES, LIDS, ASCENSION and CROSS PIPES complete. Mouthpieces ∩ shape, 16 in. by 16 in.
Apply J. CHAMBERS, Gas Offices, HENLEY-ON-THAMES.

THE Knutsford Light and Water Com- pany invite TENDERS for their production of GAS TAR and AMMONIACAL LIQUOR, for the Twelve Months ending Aug. 31, 1901. State prices for Liquor of 5°, 5½°, 6°, 6½°, and 7° Twaddel.
The Company do not bind themselves to accept the lowest or any Tender.
Tenders to be sent in on or before the 12th inst., addressed to the Chairman.

BOROUGH OF LEIGH.
(GAS DEPARTMENT.)
THE Gas Committee of the above Cor- poration invite TENDERS for the purchase of the surplus TAR produced at their Gas-Works, for a period of Twelve Months ending Sept. 30, 1901.
Forms of Tender and any further Particulars may be obtained from the Manager, Mr. John Foster, Gas-Works, Leigh.
Sealed Tenders, to be endorsed "Tar," to be delivered to me on or before Twelve o'clock noon on Saturday, the 22nd day of September, 1900.
By order,
PEREGRINE THOMAS,
Town Clerk.
Town Hall, Leigh, Lancs.,
Sept. 1, 1900.

BOROUGH OF LEIGH.
(GAS DEPARTMENT.)
THE Gas Committee of the above Cor- poration invite TENDERS for the supply of 600 6-inch CAST-IRON PIPES.
Forms of Tender and any further Particulars may be obtained from the Engineer, Mr. John Foster, Gas-Works, Leigh.
Sealed Tenders, to be endorsed "Cast-Iron Pipes," to be delivered to me the undersigned on or before Twelve o'clock noon on Saturday, the 22nd day of September, 1900.
By order,
PEREGRINE THOMAS,
Town Clerk.
Town Hall, Leigh, Lancs.,
Sept. 1, 1900.

EASTBOURNE GAS COMPANY.

TENDERS FOR GAS OIL.

THE Directors of the above Company invite TENDERS for 300,000 gallons of best GAS OIL, to be delivered at the Works within Twelve Months from the 29th of September next, according to the instructions of the Company's Secretary or Manager.
The Company have Storage for 50,000 gallons.
Tenders, endorsed "Tender for Gas Oil," to be sent in by the 8th of September next.
The Directors do not bind themselves to accept the lowest or any Tender.
By order of the Directors,
J. H. CAMPION COLES,
Secretary.
Gas Company's Office, Seaside Road,
Eastbourne, Aug. 21, 1900.

COMMERCIAL GAS COMPANY.
THE Directors of the Commercial Gas Company are prepared to receive TENDERS for the surplus BREEZE produced at their several Works, for the Twelve Months ending the 30th of September, 1901.
The quantities are estimated to be as under, but the same cannot be guaranteed, and may be more or less:—
At the Stepney Works, on the Regent's Canal—
1000 chaldrons (of 48 bushels) of Fine Coke Breeze, and
1000 chaldrons (of 48 bushels) of Rough Pan Breeze.
At the Wapping Works, on the River Thames—
2200 chaldrons (of 48 bushels) of Fine Coke Breeze, and
2200 chaldrons (of 48 bushels) of Rough Pan Breeze.
At the Poplar Works, in Bow Creek (free waterway)—
5000 chaldrons (of 48 bushels) of Fine Coke Breeze, and
5000 chaldrons (of 48 bushels) of Rough Pan Breeze.
The Tenders may be for the whole or for one or more Works separately.
The Contractors must give security to remove the Breeze as it accumulates, to pay for the same monthly, and generally for the due fulfilment of the contract.
The Form of Agreement to be signed can be seen at the Company's Offices.
Tenders, sealed, and endorsed "Tender for Breeze," to be delivered here not later than the 13th of September prox.
The Directors reserve to themselves the right to accept any Tender in part or in whole, and do not bind themselves to accept the highest or any Tender.
Commercial Gas-Works, Stepney, E.,
Aug. 27, 1900.

CORPORATION OF LEICESTER.

SULPHURIC ACID.

THE Gas and Electric Lighting Committee of the above Corporation are prepared to receive TENDERS for the supply of SULPHURIC ACID, made from either native Sicilian Brimstone, recovered Sulphur, or Pyrites. Specific Gravity in each case to be stated.

The price to include free delivery by rail into elevated Tanks, 27 feet high, at the Chemical Works, Aylestone Road.

Probable quantity about 1800 Tons, to be delivered as required during the ensuing Twelve Months.

Tenders, addressed to Alderman Lennard, J.P., Chairman, and endorsed "Tender for Acid," to be delivered at these Offices not later than Eleven o'clock a.m. on Saturday, Sept. 8 next.

The Committee do not bind themselves to accept the lowest or any Tender.

ALFRED COLSON, M.Inst.C.E.,
Engineer and Manager.

Offices: Millstone Lane,
Leicester, Aug. 24, 1900.

BOURNEMOUTH GAS AND WATER COMPANY.

ISSUE OF SIX PER CENT. PREFERENCE SHARES.

Sale by Tender of 1000 Six per cent. Preference Shares, in pursuance of the Provisions of the Bournemouth Gas and Water Act, 1896.

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL BY TENDER 1000 PREFERENCE SHARES of £10 each (the Dividend on which is limited to £6 per cent.), to be paid up in full on or before the 31st of October, 1900.

Particulars and Conditions of Tender may be obtained at the Company's Offices, Bournemouth, or of the Secretary as under.

Sealed Tenders must be sent to the Secretary not later than Eleven o'clock on Friday morning, the 14th of September, 1900.

By order,
WILLIAM CASH,
Secretary.

London: 90, Cannon Street, E.C.,
August, 1900.

LITTLEHAMPTON GAS COMPANY, LIMITED.

ISSUE OF 900 NEW £5 SHARES.

SPARKS AND SON are favoured by Instructions to SELL BY AUCTION at their Sale-Room, 25, High Street, Littlehampton, on Monday, the 10th day of September, 1900, at 3.30 p.m. precisely, NINE HUNDRED £5 SHARES in the above Company, in Lots of Four Shares each.

Full Particulars and Conditions of Sale may be obtained of Mr. W. BELDAM, the Company's Secretary, LITTLEHAMPTON; or at the Offices of the AUCTIONEERS, at LITTLEHAMPTON or ARUNDEL.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by AUCTION of GAS and WATER STOCKS and SHARES under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

HEATHCOTE GAS COAL.

Rich in Illuminating Power and Yield of Gas.

Above the Average in Weight and Quality of Coke.

Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.,
CHESTERFIELD.

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As per Analysis by
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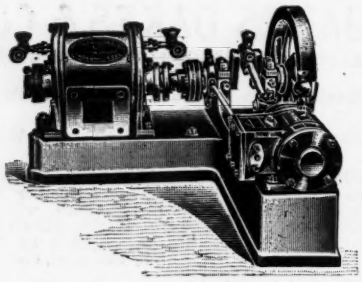

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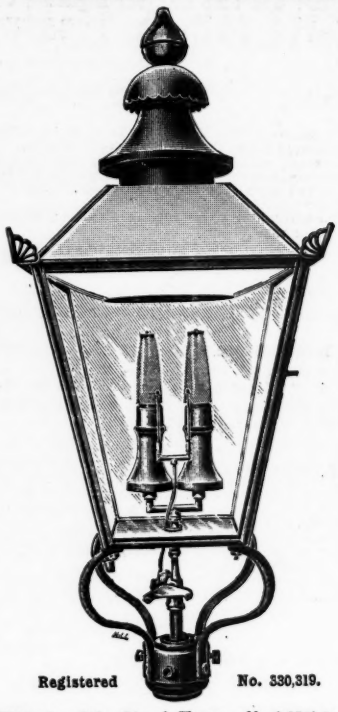

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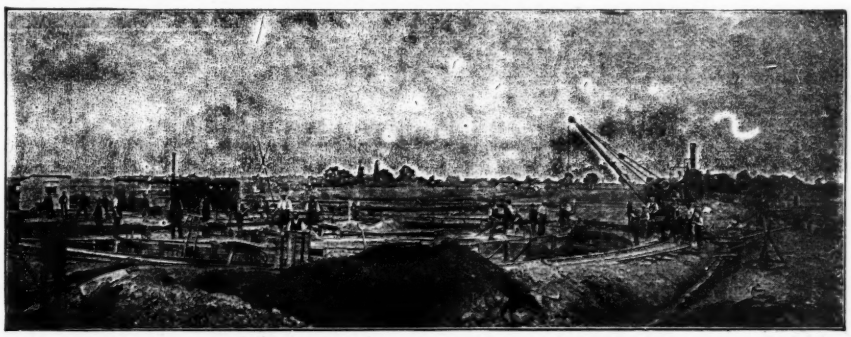

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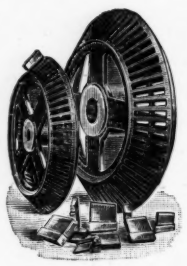

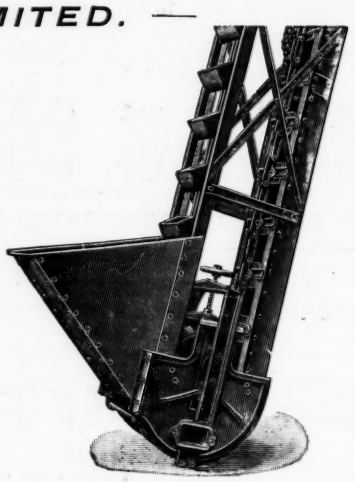

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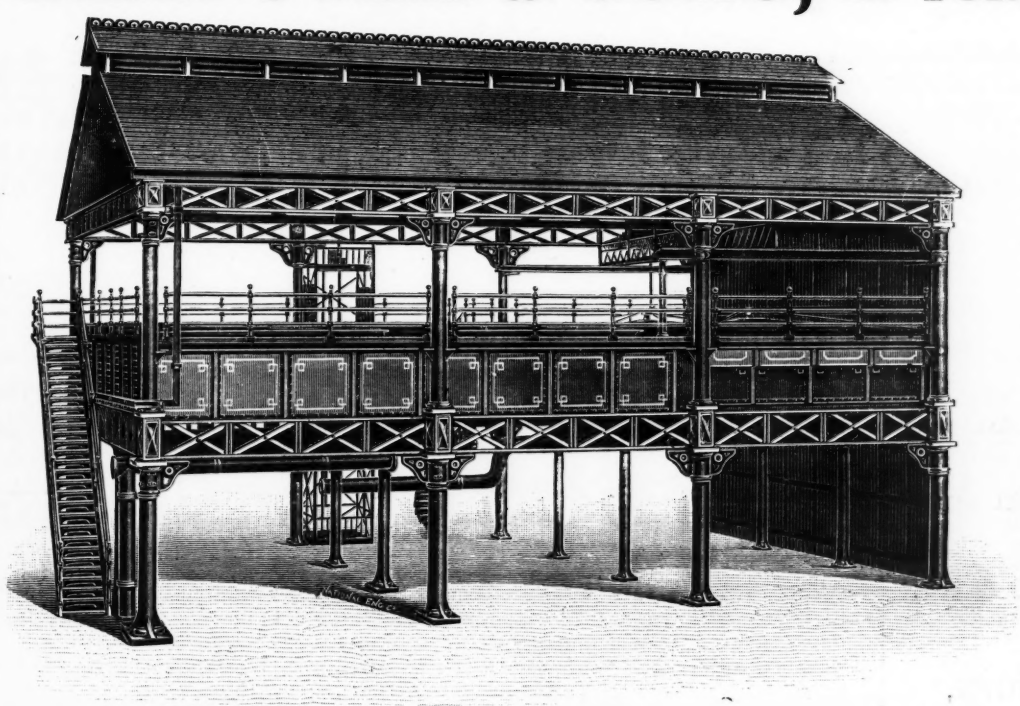

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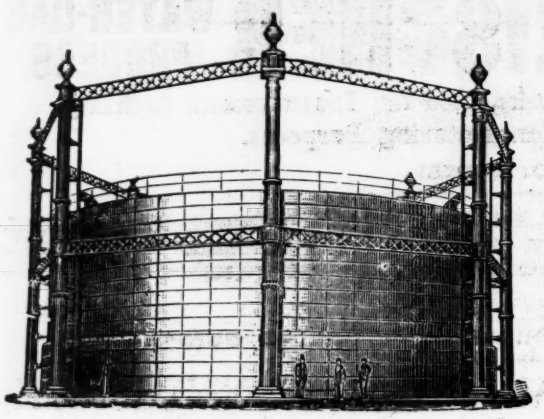

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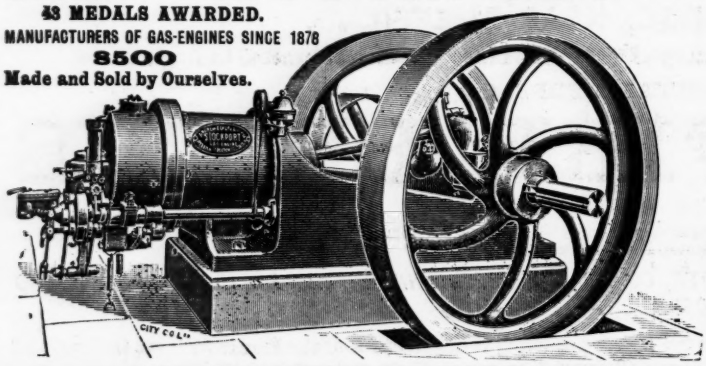

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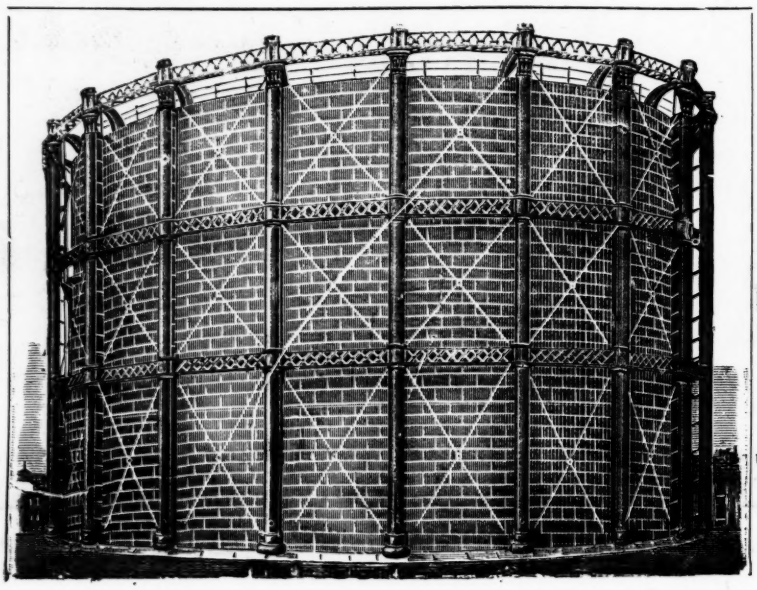

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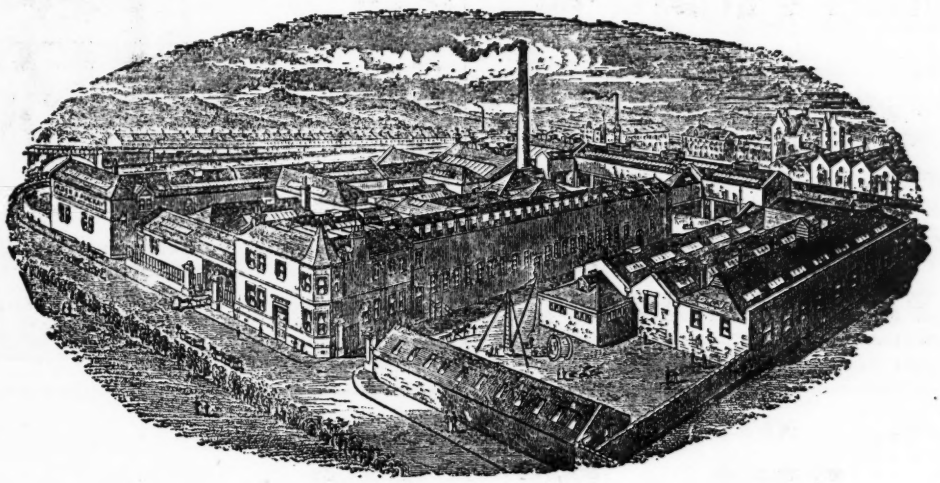

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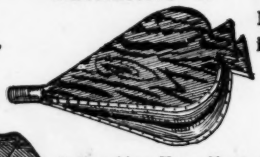

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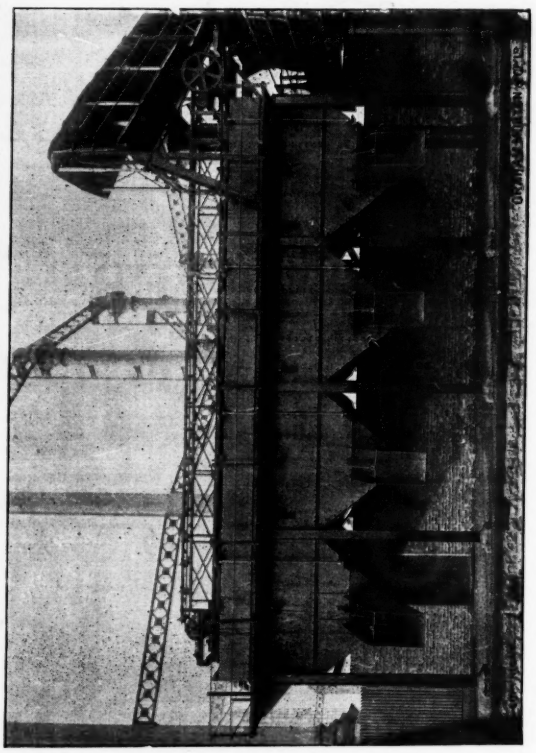

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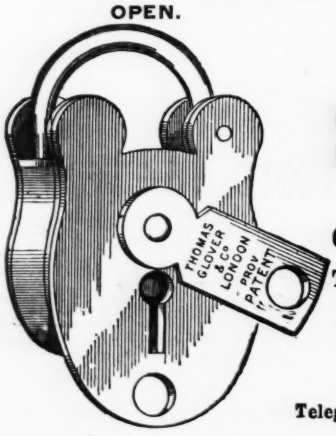

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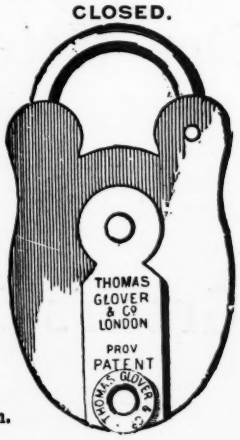

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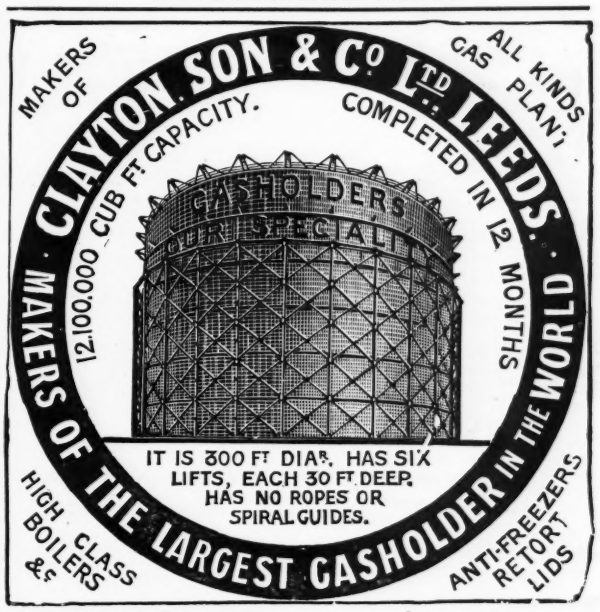
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[See also Advt., p. 570.

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